Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

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Recovery Progress—Trends

CODES for all the major rock products industries have either been approved by the President, or soon will be, except gypsum. Rumor has it that a single company is blocking all progress toward agreement on a code for this industry. The Code of Fair Competition for the Cement Industry, printed in full in this issue, in some respects is the most radical of any industry's code yet signed by the President. It not only provides for limitation of new productive facilities but for allocation of available business and for amortization of obsolete plants. The master code for the construction industry is still tied up by controversies.

Highways Not Built

Annual report of the Director of the U. S. Bureau of Public Roads reminds those interested that the 1933 session of congress made no provision for a continuance of regular federal aid—for the first time in 17 years. Instead, the NIRA provided $400,000,000 for emergency employment on road construction. The bureau, apparently, would be better satisfied if federal aid were returned to it as a regular function rather than as an emergency relief measure. All interested have reason to fear that federal aid for highway construction may cease altogether when the present emergency ends.

Rock products producers can readily understand why they have not had more highway material orders this year by examining statistics of the U. S. Bureau of Public Roads as of December 9, at which time only $7,337,000 had been expended on 297 completed projects. In other words, although nearly six months after the money was available, less than 2% had actually found its way into business channels. On December 9 the cost of highway work actually under construction was $141,795,000—still only one-third of original $400,000,000. Including work advertised for contract, but not let, only 54.8% of the $400,000,000 has yet been put to any use.

Public Works—Al Smith's Criticism Just

Alfred E. Smith's criticism of delay in starting construction projects under PWA is borne out by statistics made available the first week in December. Up to that time only $135,000,000 had actually been paid out. Washington propaganda has laid emphasis on jobs projected and jobs approved, not on jobs actually done.

Civil Works Employment Reaches Goal

December 15, CWA achieved its goal for reëmployment of 4,000,000. It is estimated 1,500,000 families are still on relief rolls. Employment is not divided as originally planned; some states exceeded quotas; some, including Pennsylvania, New York and Maryland, failed to reach theirs. The United

Executive Committee of the Temporary Code Authority of the Crushed Stone, Sand and Gravel, and Slag Industry in session at Washington, D. C.

States Conference of Mayors of Cities has recommended that the civil works program be increased to employ 8,000,000. It is estimated that the $400,000,000 allotment from the PWA will last CWA until the middle of February.

Protests on the rates of pay under CWA continue. It is pointed out that unskilled labor is being paid $12 per week in the south, $13.50 in the central zone and $15 in the north—an average of $13.50 a week for a 30-hour week. In the south this rate is 11c per hour more than for unskilled labor in numerous code industries. In the north the differences are not so great. In general, employes of code industries work 40 hours or more for approximately the same pay CWA workers get for 30 hours. Result is complaint that workers are deserting employment in some code industries for CWA jobs.

Strikes have occurred on numerous CWA works. One strike in New York is reported to have been settled by raising the hourly rate from 50 to 60c per hour for unskilled labor and agreeing to increase hours from 96 to 120 per month. Several strikes occurred in Illinois. In Chicago it is reported the building trades unions have attempted to prevent employment of non-union men, including former members unable to pay dues. Cook county civil works administrator found it necessary to *appeal* to labor union leaders to give such men a break. Down state 109 CWA laborers struck to compel the government to pay for time going to and from work. In most instances strikes have been laid to outside professional agitators.

Civil Works Administrator Harry L. Hopkins has ruled that CWA employes are hired—and can be fired—if they don't measure up to the standard of a regular job. Col. John S. Shelter, administrator for Toledo, Ohio, and Lucas county, did fire 15 men for loafing on the job. At Klamath Falls, Ore., the local administrator has promised to fire any who spend their pay checks for booze.

Misdirected Enterprise

News notes from Ohio, Iowa, Missouri, Nebraska and Kansas show that a great many towns and cities are using CWA money to open up small quarries and gravel pits for a few hundred, or at most a few thousand, tons of material. The CWA rules permit 30% to be spent for materials, tools and equipment. So far, apparently, little has been spent for materials. Result is materials cost out of all proportion to current prices for commercial stone or gravel; little real progress in construction work; numerous inexperienced men exposed to great hazards in poorly planned quarries and pits, often directed by men unfamiliar with the work, or in the safe handling of explosives; reports of serious accidents are frequent. Additional cost results to federal taxpayers from the fact that these workers are under the federal employes' compensation laws, and deaths and injuries must be paid for from federal funds.

Resolutions have been adopted at several of the regional meetings of stone and gravel producers, organizing under their code, protesting this new and spreading form of government competition. In Ohio, France Stone Co. has offered one of its quarries for CWA to get out stone, the company to crush and screen it. Fine points of liability for accidents arise in such instances.

Directors of the Illinois Manufacturers' Association have protested to PWA and CWA against what is termed "an increasing tendency on the part of the government to compete with private industry." "Such enterprises," the protest read, "not only use the taxes contributed by private industry as a subsidy for their creation, but by reason of immunity from taxation, without allowance for depreciation and through lack of necessity for showing a profit, are in a position to compete unfairly, and in the end destroy private business."

Incidentally, the TVA (Tennessee Valley Authority) is going to build a $250,000 crushing and screening plant in competition with the commercial crushed stone industry. Skilled labor will be paid $1 and unskilled 45c per hour.

Code for Labor Unions?

Industry agreed to do many things to help bring about recovery, including standing expense of increased costs without adequate price increases in many instances. Labor has agreed to do nothing. So a code for organized labor is said to be under consideration. It would be designed to end threatened and existing racket activities. National Recovery Administrator Hugh S. Johnson told the members of the National Association of Manufacturers on December 8, "It is almost certain that a bill for a 5-day week of 6-hour days will be introduced in the coming session of congress." He stated NRA will stand against any work hour reduction "that will ruin industry." He said the 30-hour week under present conditions is impossible. However, to a mass meeting of organized labor in Philadelphia on December 2, General Johnson had said he was for "a shorter week than any in the codes, as soon as increased prices, increased profits and increased business permit." On December 15 the President told newspaper men Gen. Hugh S. Johnson is going to be administrator for a long time, so far as he is concerned.

Organized labor made a desperate fight for representation on the code authorities of the various industries. Latest reports are that Administrator Johnson would not agree to it; his opinion is that should labor assume responsibility for management of industry by sitting on a code authority it would be taking on the responsibility for profit and loss in that industry. This would be a change from the present accepted position, which labor little desires to make, he believes. [In other words labor wants a share in everything but responsibility.—Editor.]

"As I see it," said the administrator on another occasion, "the ideal code authority is the trade association. With this in view, efforts will continue to build up all trade associations along uniform lines, so that they may take over the work of the code authorities for every industry." On December 17, however, he announced plans to give NRA representatives on code authorities absolute veto power on all acts of the code authority. He said he did not want NRA representatives with voting power because this would put responsibility on the government that he thought should not be assumed. [It will probably seem to most producers that the veto power, if really exercised, involves an even greater responsibility.—Editor.]

Steel Code Difficulties

Weirton Steel Co., Pittsburgh, Penn., insists it will negotiate with its labor through a company union, resisting attempts of Amalgamated Association of Iron, Steel and Tin Workers to unionize. Election by 81% of employes voting apparently justified the company stand. Nevertheless, refusal of the company to allow the National Labor Board to supervise the election promises to bring the controversy into court. The National Labor Board has asked the U. S. attorney general to prosecute.

Speaking before the American Mining Congress at Cleveland, Ohio, December 15, Donald B. Gillies, local steel magnate, said: "Under the code, the steel industry, operating at greatly reduced capacity, is giving employment to more than 400,000 employes, or practically as many as were on the payrolls in 1929. It is safe to say that never before has a single industry in so short a time accomplished so sweeping an improvement in employment conditions of such a large volume of workers. Let there be no mistake about it—the steel industry stands whole-heartedly with the President in his great effort to bring about recovery and increased employment. Coöperation with this effort to the end of contributing to its success and full compliance with NRA provisions are dominant policies in the steel industry today."

Dry Cleaners Defy NRA

Federal district court at Tampa, Fla., refused an injunction sought by competitors to restrain a local cleaning and dyeing establishment from cutting prices below minimum established in code. The judge held NIRA, if applicable to the operation of the local concern, is void since congress has no power under the constitution to enact a law providing for regulation of such establishments. The court said: "It is conceded by counsel for complainants that neither the complainants nor the defendant are engaged in interstate commerce, and without such concession, it would require a stretch of the imagination beyond the power of this court to conceive that a local industry engaged in pressing, cleaning and dyeing clothes was engaged in interstate commerce. So if the code for this industry is to be justified under the constitution it must be upon the ground that

an emergency exists which would justify congress in attempting to regulate a purely intrastate business. There is no authority in the constitution which authorizes the national government in any emergency to depart from its constitutional function and invade the reserve power of the states."

NRA officials professed not to be disturbed by the decision, contending that it was on a minor point only and did not have weight on the general application of NIRA.

Subsequently over 150 members of the industry were summoned to Washington to answer to the NRA compliance board for alleged price-cutting. About 100 showed up. Only one promised to live up to the code. The national compliance director called the others "crazy" and "fools." The cleaners booed, and some are reported to become almost hysterical. The Federal Trade Commission will prosecute. The consumers advisory board of NRA is reported opposed to the price scales. They are against price-fixing and will welcome a decisive court case, it is said.

At Newark, N. J., the state chancery court upheld code price-fixing by an injunction restraining a cleaning and dyeing concern from charging less than code-established prices—a state law involved here also (see below).

Coal, Oil and Lumber Violators

Department of Justice has been called upon to force observance of the coal industry's code on a Missouri coal company and on an Iowa coal company. This action was taken after code authorities and compliance board units had been repulsed in attempts to bring about compliance.

Los Angeles representatives of Department of Justice have started action against California violators of the petroleum industry's code. They are charged with producing in excess of their quotas. A court order to close the wells is asked.

Federal district court at Portland, Ore., set December 18 to hear a case in behalf of a lumber code violator, who is seeking an injunction to prevent the lumber code authority from curtailing hours of production in his mill.

State Cooperation for NIRA

Ten states have already passed laws designed to supplement and aid the enforcement of NIRA. They are California, Colorado, Massachusetts, New Jersey, New York, Ohio, Texas, Utah, Virginia and Wisconsin. Legislatures in other states to meet soon are expected to pass similar laws. These are all "emergency laws" and cease automatically with NIRA. California, New Jersey, New York, Ohio, Utah and Virginia make it a state offense not to comply with an NRA code. They do away with any possible legal defense that a particular employer is engaged in intrastate commerce only. [As in the Florida case cited above.—Editor.] California, New Jersey, Ohio, Utah and Wisconsin laws provide for state codes of fair competition to be approved by the governors. California state codes are to be superceded by NRA codes as fast as these are approved by the President. The other state codes are designed to be supplementary to NRA codes. Colorado, New Jersey, New York, Ohio, Texas, Utah, Virginia, and Wisconsin provide that their anti-trust laws shall not interfere with either NRA or state codes. California, New York and Virginia limit awards of public works contracts to those complying with NRA codes. New Jersey makes it a misdemeanor to falsely display the Blue Eagle, or other NRA insignia. Under the California law in all contracts for state public works contracts it is provided that the contractor shall give a preference of 15% to materials supplied in observance of an NRA code, and a preference of 10% to bidders who agree to furnish only such materials.

Enforcement Methods

The NRA can adjust complaints and arbitrate disputes (use persuasion) but it is not itself the ultimate enforcement agency back of the codes of fair competition. NIRA provides that the Department of Justice and the Federal Trade Commission shall enforce the codes. The provisions of approved codes are declared to be standards of fair competition and violations are deemed unfair methods of competition within the meaning of the Federal Trade Commission Act. The Commission is charged with the duty of making such investigations as may be necessary to enable the President to carry out the provisions of NIRA. The NIRA further specifies that it shall be the duty of the U. S. district attorneys, under the direction of the attorney general, to institute proceedings in equity to prevent and restrain code violations, and to criminally prosecute for violations.

Not Exempt from All Anti-Trust Laws

National Recovery Administrator stated December 8: "Trade and industrial groups are not exempted from provisions of anti-trust laws except insofar as they are expressly authorized to act in accordance with specific provisions of a code or agreement under NIRA approved by the President. Arrangements between members of an industry or trade to fix or maintain prices not expressly sanctioned by an approved code or agreement are therefore in violation of anti-trust laws to the same extent as before NIRA." It is reported that NRA economists are opposed to fixing prices in codes. In code price provisions based on cost, the NRA policy board is said to have ruled that cost should be defined to the extent of indicating its principal elements in a general way, including a reasonable allowance for depreciation, but in no case a return on capital. Open-price systems will be encouraged under these conditions: (1) Shall be effective within not more than 10 days in complex industries and 5 days in simple ones; (2) shall be withdrawable at pleasure of seller; (3) not subject to veto or modification by any agency; (4) must be generally published for benefit of buyers as well as sellers.

Reactions to Price Advances

Portland, Ore., sand and gravel producer bid $15,000 on a year's supply of aggregates for the municipal asphalt plant. This was 25% less than prices for the current year. The other competitor bid $20,000. The city commissioner of public works was notified that the low bid was not in line with the code of the industry. The competitor suggested all bids be rejected and new bids within the code be asked for. The city council agreed to support the code and ask for new bids.

Mayor Holcombe, Houston, Tex., charged collusion in bids on sand and gravel and oyster shell. The one acceptable bid on 2,000 tons of gravel was awarded at $1.59. The only other bid was rejected because it was not accompanied by a deposit check of 5% of the amount bid as required by law. An order for 3,500 tons of shell was split between two producers at $1.35 per ton. A third bid was rejected because unaccompanied by a check. The mayor is reported to have said: "I am not in favor of awarding contracts on such bids. The NRA doesn't set prices. There is something wrong with these bids."

Governor Bryan of Nebraska having heard of the recent regional organization meeting of crushed stone and sand and gravel producers at Omaha is reported to have denounced "attempts to raise prices by means of an NRA code they have been formulating"; he said: "the state does not expect to be dictated to or governed by any such effort." He promised, if it is the code's plan to raise prices unreasonably, "the state will take whatever action on opening its own gravel pits that may be required."

Quarry Man Gets Code Exemption

H. C. Armond, contractor, Elba, Ark., has a contract with the Birmingham Slag Co., Birmingham, Ala., to furnish rip rap for a government revetment job at Greenville, Miss. Operating under the crushed stone industry code he would be permitted to work his employes but 40 hours a week and pay them not less than 30c per hour. Because of his contract and peculiar prevailing labor conditions he will be allowed a 48-hour week and a minimum wage scale of 25c per hour.

Wage Differential Causes Move

Owing to wage differentials between South and North, Roberts-Liggett Manufacturing Co., Metropolis, Ill., makers of boxes and baskets, will move to Missouri or Arkansas. Most of its business is South and it is unable to compete with a firm just across the Ohio river in Kentucky which has a lower wage scale under the code of the industry. From 150 to 600 men and women employes are affected.

More Money for Construction

Public Works Administrator Ickes has indicated that the next congress will be asked

to appropriate $1,500,000,000 to carry through to completion the program to put men back to work through government financed construction.

The NRA division of economic research and planning has developed a program of needed construction calling for $14,000,000,000. This program contemplates:

Housing	$ 4,532,000,000
Recreation facilities	450,000,000
Health and sanitation	136,000,000
Grade crossings and highways	2,400,000,000
Express highways	1,800,000,000
Railway improvement	1,500,000,000
Industrial and commercial improvement	1,800,000,000
Education facilities	300,000,000
Modernization	650,000,000
New outlets	(Unestimated)
Total	$13,568,000,000

This is submitted as a study of possibilities and not as a recommendation that the government embark on such a tremendous undertaking.

United States Senator Robert M. La Follette, Jr., radical republican of Wisconsin, in an address at Rochester, N. Y., said the new congress will try to put through a $10,000,000,000 public works program as an indirect inflation, and a mandatory law for direct inflation if the public works measure fails. He said: "I am going to fight for a huge public works program. The present program has been snarled up in red tape, but it looks as it would really get underway by next spring. There are things which need to be done and must be done in time, such as slum clearance, grade crossing elimination, highway development and others."

A minimum of $650,000,000 can be spent usefully in renovation of homes and buildings, according to the detailed survey by the NRA research and planning division. Part of the plan is the taking of a "real estate inventory" in the 50 leading cities of the country. It is contended that while the real estate and construction markets of the country furnish a heavy percentage of employment and constitute a large portion of capital values, no accurate knowledge is available as to condition of existing real estate, percentage idle, or need for new construction.

The Federal Subsistence Homesteads Corporation, which has $25,000,000 to experiment with, has received proposals for projects totaling more than $750,000,000. Only two projects are actually under way, one at Reedsville, W. Va., and one at Dayton, Ohio.

Outlook for Private Construction

Prudential Insurance Co. of America is going ahead with an $800,000 low-rent housing project at Newark, N. J., without waiting for government help.

Success of the Mathieson Alkali Works, Inc., in financing through a new issue of nearly $7,000,000 stock a development program, including a new plant at Lake Charles, La., encourages the belief that the new Securities Act will permit corporation financing in spite of many predictions to the contrary.

Building Prices Rising

The home-building and home-owning committee of the United States Building and Loan League predicts an upward trend in real estate prices early in 1934. The report says that since November 1, lumber that cost $1,000 this past construction year now costs about $1,558. Brick and tile that formerly cost $1,000 now cost $1,110. Cement that cost $1,000 now costs $1,153. "Thus it is apparent," says the report, "that the rise in building material prices is general, but lumber is far out ahead." The report doesn't say, but rock products producers will please note, that the 50% increase in lumber prices should make it easier to sell concrete and other fireproof building materials.

Codes and Demurrage

Resolution adopted by the American Railway Association says: "No change should be made in demurrage rules on account of industrial operation under NIRA." Executive secretary of National Industrial Traffic League says shippers will not be satisfied with such a ruling. Operating on a 5-day week rock products operators may be put to considerable expense if demurrage for Saturdays is enforced on cars that cannot be loaded without violation of an NRA code.

Code Administration Costs

Assessments for code administration costs are going to run into real money. Estimates for the crushed stone, sand and gravel and slag industries code anthority are said to run from $7,500 to $12,000 per month. These will be based on tonnage outputs of 1932. The regional organizations will also require budgets. In one district the proposal is to supply funds for the regional organization by a straight monthly due, the same for all producers.

Chicago merchants, under the NRA retailers' code, are assessing themselves $1 per year per employee to obtain funds to finance the code.

Price Kick Convention Postponed

Lack of properly authenticated evidence of unwarranted price increases caused the postponement of the NRA public hearing scheduled for December 12 until January 9. Prior to the hearing, Deputy Administrator A. D. Whiteside, who will preside, probably will issue statements from time to time disposing of general questions which may arise regarding price increases. The procedure required notice of intention to appear be filed prior to December 23.

Retail Lumber Prices Arouse Ire

A flood of complaints are reported reaching NRA headquarters about prices of retail lumber. Under the codes of lumber and building supply dealers' methods of cost accounting must be submitted to NRA and approved before prices can be set. It is said many dealers are anticipating submission of cost figures and sharply raising prices. It is believed at NRA that most of these increases are due to ignorance of code provisions.

States to Spend Own Money for Roads

Colorado and Maryland are increasing their road building activities through bond issues. Colorado is borrowing $7,000,000 at 4% and accepting a grant of $3,000,000 from PWA. Maryland is borrowing $4,000,000 and taking a grant of $1,200,000. Maryland's total program for 1934 is approximately $11,000,000.

Early Test for Cement Code

Illinois asked for bids on highway cement for 1934 on the day before the cement industry's code became effective. Only one bidder, unnamed at this writing, responded. Four producers notified the highway department the code prevents them from bidding on a whole year's supply. Bids were asked on approximately 1,000,000 bbl. The state has appealed to NRA for an interpretation. Governor Horner, of Illinois, went to Washington on two or three occasions in attempts to block adoption of the code.

Can't Agree on Mid-West Coal Prices

Illinois, Indiana and western Kentucky coal operators failed to agree on price differentials at NRA conference in Washington, week of December 10. After day and night sessions, which began December 5, producers left convinced that NRA must fix prices; NRA reported to be very reluctant to impose arbitrary schedules.

Lumber Code Violator Going to Court

Centreville, Ala., sawmill operator, W. E. Belcher, has been cited to the Department of Justice for alleged violation of wage and hour provisions of the Lumber Industry's Code. Sub-divisional agencies of the code authority exhausted all their powers to bring about voluntary compliance. Among the documents submitted were an affidavit to the effect that laborers at the Belcher mill stated their hours of work were unlimited, and their pay 15c per hour; a further affidavit to the effect that laborers, on October 27, were receiving 10c per hour up; and an admission by Belcher to the Lumber Code Authority that he was not operating under the code.

Up to December 1 the Lumber Code Authority reported only 171 charges of violations of day and hour provisions. Upon investigation 27 resulted in proper adjustments and 22 were found unwarranted. Supporting evidence was developed in 19 cases, 3 were turned over to NRA for action; 14 are being reviewed and the others are still being investigated.

The report emphasizes the benefits to small mills; says, "these heretofore helpless victims of trade methods they could not change" may now look forward to receiving a price which will enable them to pay the higher wages required of them.

Measure of Damages for Failure to Deliver Crushed Stone According to Contract

By Leslie Childs

WHILE THE MEASURE of damages for failure to deliver a product according to contract is usually the difference between the contract price and the market price, at the time and place when and where delivery should have been made, this rule does not always apply in the sale of a product for a special purpose. Here the nature of the contract and the results which the parties must have anticipated would flow from a breach are also usually entitled to consideration.

The application of this rule to a case involving the alleged breach of a contract to furnish crushed rock is illustrated in a striking manner in a recent case that arose under the following facts and circumstances:

Contract to Furnish Crushed Stone Entered Into

In this case a limestone company entered into a contract whereby it agreed to deliver a minimum of 500 tons of crushed limestone per day to a highway construction company for use upon a highway under construction. Out of 56 active working days the limestone company furnished 500 tons per day for but six days, and the balance of the days deliveries averaged but 352 tons.

Upon the conclusion of the work the limestone company presented its bill for about $16,000 and the construction company counterclaimed for $9000 damages for the alleged failure of the other to deliver according to contract. This counterclaim was supported by evidence that tended to prove that the cost of laying the rock on the highway as it was delivered was $2.02 per ton, whereas if delivery had been made according to the contract the cost would have been only $1.57½ per ton. The difference was then demanded in damages.

A lawsuit followed. A jury found for the construction company, allowed it $9000 damages on its counterclaim, and returned a verdict for the limestone company for the balance of its claim. From judgment on this the limestone company appealed, and the higher court, in reviewing the record and in affirming the judgment, in part said:

The Language of the Court

"The parties both understood this stone was to be used in building a highway, and the contractors were prepared to use 500 or more tons of stone per day. Both understood that if the contractors did not get that much stone per day, their men and machinery would be idle for some part of the day. . . .

"Such enforced idleness, both parties knew, would be reflected in the cost of the finished work. . . . The contractors had no means of anticipating when a breach would occur or the extent of it. The first knowledge the contractors could have of a breach would be when their trucks called for stone and their drivers were told, 'That's all for today.' The record shows it was not possible when such a breach occurred for the contractors to get then and there from someone else the stone needed to finish out that day. . . .

"The court instructed the jury to find for the contractors such a sum on their counterclaim as would represent the difference between what it actually cost them to lay this stone and what it would have cost them if the limestone company had delivered them not less than 500 tons of stone per day. We regard that as the correct measure in this case. . . . These instructions follow a well-recognized rule that the measure of damages for the breach of a contract is that sum which will put the injured party into the same position he would have been had the contract been performed. . . . The judgment is affirmed." (51 S. W. 2d 465.)

Government Members of Code Authorities

THE National Recovery Administration has announced government members of the Code Authorities in the rock products industry as follows:

Cement: **Barton W. Murray.**
Crushed Stone, Sand and Gravel and Slag: **B. R. Value.**
Concrete Masonry: **Ralph Fogg.**
Lime: **W. V. Brumbaugh** and **Ralph Fogg.**

Duties of Government Members

(1) Refer with recommendation to the Administrator through the division administrator those matters mentioned in the code as being subject to review and/or the approval of the Administrator.

(2) Recommend to the division administrator such other matters as in his judgment are important to the welfare of the industry, or to the public interest, or to the consumers or employes affected by the provisions of the code.

(3) Through the Code Authority secure complete assent to and compliance with all provisions of the code by each unit of the industry.

(4) Assist the Code Authority in connection with the preparation of recommendations for necessary interpretations, modifications, and additions to the code. Consult with the division administrator in reference thereto.

(5) Warn and guard against threatened deviations from the code or non-observance of its terms or action contrary to the principle of NIRA.

(6) Constantly scrutinize the operation of the code and see that it does not permit or promote monopolies nor tend to eliminate or oppress small enterprises.

(7) Advise with the Code Authority in seeing that its affairs are handled in a cooperative and fair manner with respect to all units under the code, making sure that the provisions of the code are strictly adhered to with an equitable and fair settlement of all matters covered by the code pertaining to the interests of the general public, consumers, or employes.

(8) Assure himself and the division administrator that the industrial members of the Code Authority are truly representative of the entire industry and elected by a method fair and equitable to all concerned.

Sand-Lime Brick Production and Shipments in November

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Nine sand-lime brick plants reported for the month of November, this number being one less than the number reporting for the month of October, statistics for which were published November 25.

Average Prices for November

Shipping point	Plant price	Delivered
Madison, Wis.	$	$12.50
Detroit, Mich.	....	11.50
Pontiac, Mich.	9.50	11.50
Syracuse, N. Y.	18.00	20.00
Grand Rapids, Mich.	....	12.00
Mishawaka, Ind.	8.50	....
Saginaw, Mich.	10.50	....

Statistics for October and November

	†October	November
Production	881,750	*1,430,975
Shipments (rail)	19,000	773,000
Shipments (truck)	890,639	642,190
Stocks on hand	2,188,653	1,484,768
Unfilled orders	245,000	1,775,000

†Ten plants reporting; incomplete, seven not reporting unfilled orders.
*Nine plants reporting; incomplete, five not reporting unfilled orders.

Portland Cement Yardage

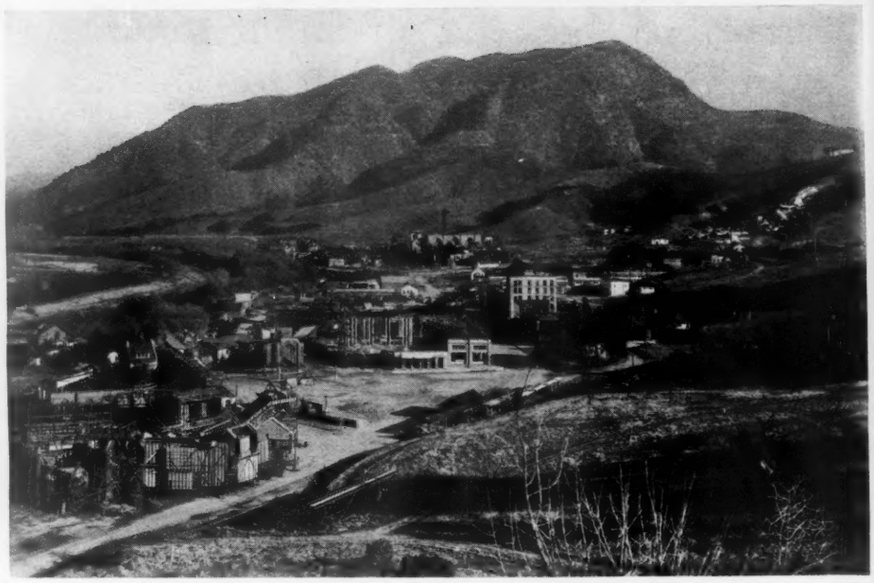
AWARDS of concrete pavement for November and for the first eleven months of 1933 are announced by the Portland Cement Association as follows:

	Sq. yd. awarded during November, 1933	Sq. yd. awarded to date, Dec. 2, 1933
Roads	4,170,798	33,030,268
Streets	1,351,698	5,996,557
Alleys	19,478	183,175
Total	5,541,974	39,210,000

Movie Studios Surround Sand and Gravel Plant

• Provide New Market

By A. B. Laing,
North Hollywood, Calif.



Universal City moving picture studios and sets adjacent to property of Burbank Rock Products Co. in San Fernando Valley, Calif.

FOR years, the up-to-date plant at the Burbank Rock Products Co. has been producing clean, sharp sand and gravel from its 20-acre deposit in the San Fernando Valley of California.

And now this raw material adjoins the properties of one of the gravel company's best single customers—the movies. On three sides lie Warner Bros., Mack Sennett studios, and the 300-acre Universal City. All these movie companies are now consuming increasing tonnages of sand and gravel—thanks to some snappy missionary work on the part of the Burbank company's salesmen.

Formerly, motion picture producers faced with a script calling, for example, for a seaside episode, had to transport the players, sound, lighting and camera equipment together with platoons of technicians to the seashore. Rehearsals and actual "shooting" might last two days or two weeks, at the usual overhead expense of $3,000 per hour (approximately). The Burbank Rock Products Co. salesmen persuaded a group of art directors to try "dressing" such "sets" on the "lot" where all equipment and personnel were conveniently at hand. To be brief, a lot of technical difficulties were overcome, with the assistance of the Burbank company's salesmen, and "shooting" at home is now an almost universal practice. The savings in time, supervision and cash are obvious.

Artificial "Delta of the Nile"

The delta of the Nile was faithfully reproduced inside one of the 200 ft. x 100 ft. x 92 ft. sound stages, for a picture called "The Mummy," at a tiny fraction of what it would have cost to move the company to a back-country desert location. And rock products have been "called" to enact aonther star role in "The Road Back." "Danny" Hall, art director, requisitioned washed sand for 100,000 plaster yards to be used on interior scenes alone in this picture.

Microphone reverberation—the bogey which militated against the use of plastered "sets" for long—has been overcome. Wall sections closely framed (12 in. o. c. for studs and headers) aided where possible by heavy drapes, etc., have made plastering safe. The result, of course, is greater realism, better pictures.

Besides shipping their finished product to the nearby studios, the Burbank Rock Products Co. turns out 1½-in., ¾-in. and pea gravel for ordinary purposes, and ships within a radius of 40 miles. Two lynx-eyed salesmen study building permits, remodeling, gas station openings, etc. The last named activity has been responsible in large measure, for the unusually large turnover of pea gravel which Burbank enjoys.

Art Director Hall dresses a set with 90 yards of washed sand for "The Mummy," a Universal film production

Deep Pit Operation

This company, it will be remembered, acquired this business from Walter L. Stine, early in 1932. Since then the pit has been enlarged to practically 5 acres, and deepened to over 80 ft. (Very little seepage.) Workmen suspended from the brink by ropes, loosen the deposits with hand bars. At the bottom, the material is picked up by a 1-yd. Bucyrus, crude-oil burning steam shovel, and loaded to 20-in. belt. This conveyor system, now about ¼-mile in length, is powered by Edison electric motors.

The company has twenty Autocars—all the 6-wheel type, upon which they have standardized, for making deliveries.

Rip-Rap for a Breakwater

• West Coast Producer Turns Quarrying Experience Into Profit

By Walter B. Lenhart

General view of upper (older) quarry of Graham Bros., Inc., Catalina Island. Gas shovel in foreground

WITH sales of crushed stone near the zero point, Graham Bros., Inc., Long Beach, Calif., jointly with the Catalina Rock Co. and the Puget Sound Bridge and Dredging Co., turned their attention to rip-rap for the Los Angeles-Long Beach harbor development. A contract was secured for quarrying, delivering and placing rock for 1400 lin. ft. of new breakwaters. All the rock for this section of breakwater is coming from the Catalina Island quarry operated by Graham Bros. In addition to this contract, these operators secured the contract for construction of the yacht harbor at Santa Monica, Calif. At this place huge concrete caissons are filled with rip-rap and sunk, and will provide a safe harbor for small yachts. The rip-rap for this job also comes from the Catalina Island quarry.

By combining the two contracts, from an operating standpoint, several savings are apparent, the essential one being that the Federal breakwater at Long Beach requires stone from 4 to 25 tons in weight, while the Santa Monica job will take "man size" stone as its minimum size. Thus, even though the rock at Catalina Island (a lucite) is somewhat shattered, it is possible to secure the sizes of stone wanted without a maximum amount of waste.

A new quarry has been opened up on the east end of the island and about one mile from the old quarry. The new quarry is below the older one and quite close to sea level. Both the old quarry and the new supply rip-rap for both jobs mentioned above.

On the Federal breakwater job the rock is loaded on self-dumping barges, which are towed to the place of use and dumped. When the breakwater reaches an elevation that the use of these barges is impossible the larger capping stones are placed by means of a stiff-leg derrick mounted on a barge. Stones 10 to 25 tons in weight are required for the capping.

On the Santa Monica job the stone is loaded into skips that hold roughly 10 cu. yu. The skips are piled on barges holding 600 to 800 tons each, and towed to Santa Monica, where they are dumped by a stiff-leg derrick. The empty skips are then returned to the quarry on the island.

The stones are loaded by one of three shovels; two old steam shovels and a newer P. & H., gasoline shovel being used. The shovels load to specially designed truck bodies, each holding 10 cu. yd., and are hauled to the water's edge, where one of two stiff-leg derricks either dump the skip to barges, or the skip is placed on the deck for haulage to Santa Monica as previously described.

Each of the stiff-leg derricks is provided with a five-drum electric hoist and is powered by a 100-hp., G. E. motor.

The stone is shot down by means of toe holes drilled with tripod mountings. Black powder is used for the most part, and results in shattering the stone so that a maximum amount of rip-rap is secured. Owing to the natural characteristic of this quarry, this is quite difficult, for the quarry face is quite seamy and shattered, although the individual pieces of stone used are quite homogeneous and make excellent rock for rip-rap. About 20 to 25% of the total rock shot down is too small for rip-rap, and for the most part is used as the source of commercial crushed stone.

Owing to the nature of the rock and other features of the quarry a systematic method of placing holes for blasting is not practicable, each shot planned separately.

Left: Loading rip-rap to a self-dumping barge near island quarry. Right: General view of new quarry opened to supply rip-rap for Los Angeles-Long Beach harbor breakwater

The Silicosis Problem and the Quarryman

By C. H. Vivian

CONSIDERABLE material regarding silicosis has been published from time to time, but the information was of such fragmentary nature that it is doubtful if the average quarry operator has in mind a clear picture of just what silicosis is, how it concerns him now, and how it may concern him in the future. This article is an effort to clarify the situation. It is written with the object of imparting information and not for the purpose of exciting fears or contributing to hysteria.

Silicosis has been recognized as an occupational disease in South Africa for more than 30 years. It is a subject of open discussion among workers in the stone trades in various countries of Europe. It is compensable in Canada under certain conditions. In this country the United States Public Health Service has been conducting a study of it for a number of years. Legislation seeking to control it is on the statute books of at least five states and in two of them it is compensable. Indications are that within the next ten years a majority of the states will enact laws of one sort or another with the object of preventing or limiting its inception on the one hand and of insuring that victims will be dealt with equitably by employers on the other hand.

Thus far more attention has been paid to it in the mining industry than elsewhere for the reason that it is a more pronounced hazard in confined underground working spaces than in the open air. It does, however, constitute a definite hazard in various other industries. Among those subject to it, other than quarry workers and miners, are sand blasters, lens grinders, and workers in various other so-called dusty trades, including rock products crushing and grinding. Already foundrymen have taken official cognizance of it and at the annual convention of the American Foundrymen's Association in Chicago last June it was discussed at considerable length. Most of the literature concerning the nature of the disease is clothed in medical language that is unintelligible to the layman. As a clear understanding of its character and its consequences is essential to any consideration of means of coping with it, an attempt will be made to present the important facts in simple terms.

Editor's Note

WHILE this article deals primarily with the dust hazard in percussion drilling of rock, it is also relevant to all crushing and grinding operations in rock products plants.

It is of particular interest because it shows progress in dust elimination in open-air quarrying operations, which are generally considered the least hazardous, from a silicosis point of view, of the various operations in processing rock products.

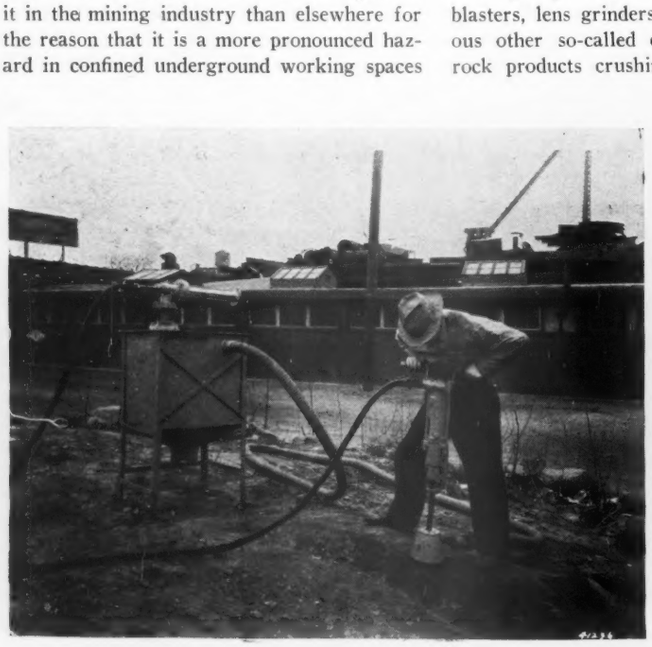
Probably the time is fast approaching when all quarry operators and processors of silica-containing rocks will have to go the limit in dust-collection and prevention. As pointed out in this article, rock products operators should cooperate with foundry men, cut-stone contractors, construction men and others who are facing the same problem.

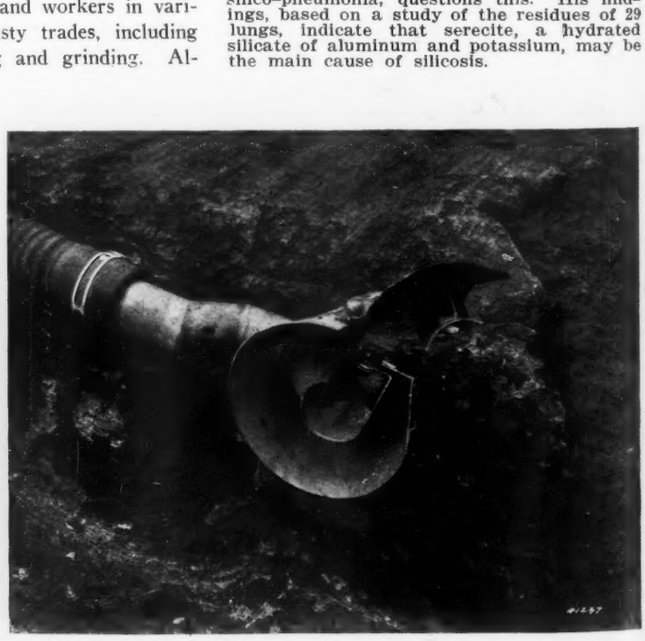
THE EDITOR.

Silicosis Defined

Silicosis is an infection of the lungs which results from inhaling silica dust.* In general, the danger of contracting it increases in direct ratio to the percentage of free silica in the dust that is breathed in. Silicosis causes changes in the lungs which manifest themselves by the formation of small nodules of fibrous growth. These reduce the air capacity of the lungs, restrict the natural elasticity of these organs, and thereby interfere with the essential bodily function of breathing. Silicosis renders its victims increasingly

*Until recently it has been considered that silica alone was responsible for silicosis. Lately, however, Dr. W. R. Jones of the Geological Department of the Imperial College of Science and Technology, Canada, reporting upon the character of the dust found in the lungs of victims of silicosis or silico–pneumonia, questions this. His findings, based on a study of the residues of 29 lungs, indicate that serecite, a hydrated silicate of aluminum and potassium, may be the main cause of silicosis.





Left: Jackhammer drill equipped with dipper-type hood. The collector is of 100-cu. ft. per minute capacity, and operates with an air ejector shown mounted at its top. Right: One type of hood for jackhammer type drills, showing internal construction. Note how segment opens on hinge to allow it to pass around the drill steel. Outer cone rests on rock being drilled. Inner cylinder is raised slightly above the rock surface

Left: Six drillers with jackhammers drilling in a circle at demonstration of dust trap at Rockefeller Center, New York, N. Y. Right: Same drillers at work with dust hoods in use

susceptible to tuberculosis and may therefore be considered a leading contributory cause of the "miner's phthisis" or "miner's consumption," which is found to a considerable extent among veteran workers in silica-laden dust.

Nature equips us with efficient means for filtering the air we breathe, but the mechanism is designed to do only so much work. When it becomes overloaded, some dust will inevitably pass it. Considering that a person 50 years old has inspired air somewhere near 600,000,000 times, it is really amazing that his lungs have not become dust-clogged. Actually, only an extremely small proportion of the foreign matter that enters the nostrils ever reaches the lungs, and approximately half that which does is exhaled again. Most of the material that lodges in the lungs is relatively harmless. Autopsies on the bodies of normal elderly persons generally reveal enough dust, including coal dust, to cause some discoloration of the lungs and the deposit probably comprises hundreds of thousands of millions of particles. Even so, it ordinarily has done no great damage.

Once it is within an air sac of the lungs, all dust incites the appearance of special cells known as phagocytes. These surround the dust particles and seek to eliminate them, either with the exhaled air or by moving them on into the blood stream. Sometimes they succeed, but often they fail, and the particles, together with their enveloping cells, remain in the lung tissue. Obviously, the greater the number of particles breathed in, the more of them that will remain.

Most dusts exert comparatively little ill effect, but silica-containing dust constitutes a real menace. Silica is soluble in certain alkaline body fluids and when dissolved by them is changed from the crystalline state to the colloidal form of silica sol, a substance which is poisonous to cell life. The inclosing cells are killed, and this, in turn, causes the death of neighboring cells and sets up the fibrous accumulations previously mentioned. As this condition of fibrosis progresses, scars in the form of nodules appear. These reduce the useful area of the lungs for breathing and also detract from the elasticity of the lung tissues.

Silicosis does not react to hard and fast rules. The duration of exposure required to produce it and the time that elapses before it appears are both subject to wide variations. There are many cases on record which did not show up until from 10 to 25 years after the exposure started. In general, however, intensity and length of exposure have direct bearings upon the incidence of the disease.

Stages of Silicosis

In the United States, silicosis has been divided arbitrarily into first, second, and third stages. These correspond to the anteprimary, primary, and secondary stages as defined in South Africa. In first-stage silicosis, definite signs of the disease are present, but the victim's capacity for work is unaffected. In the second stage, the capacity for work is hampered, but not seriously. The third stage brings serious and permanent reduction in capacity for work. Tuberculosis often complicates all stages.

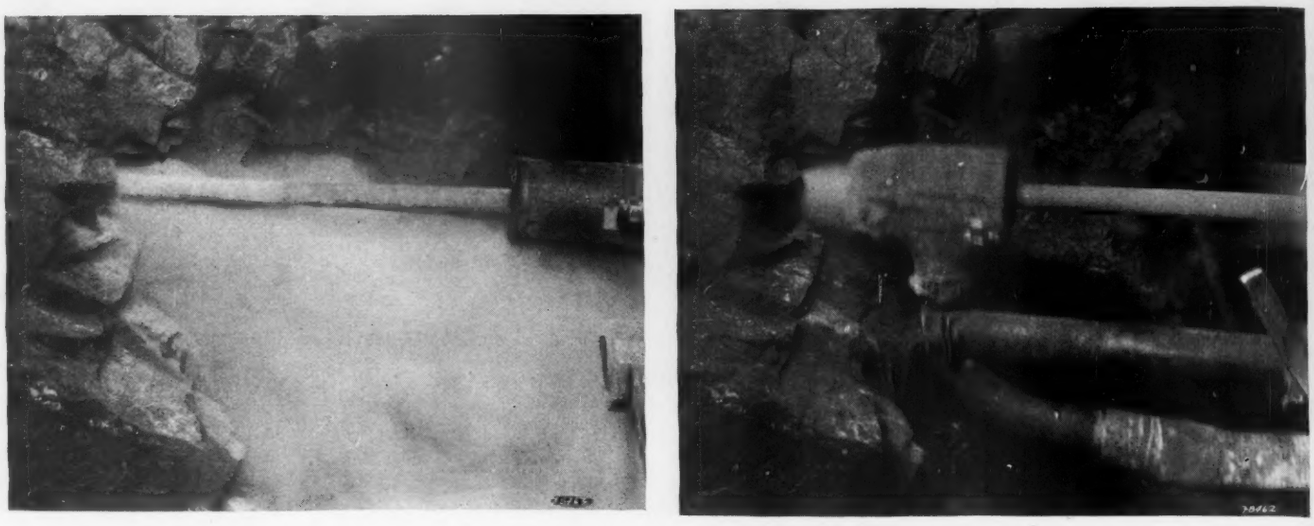
The cardinal symptom of silicosis is shortness of breath. This is accompanied by a decrease in the chest expansion, although in the early stages the chest itself exhibits the outward tendency of becoming enlarged or barrel-like. The shortness of breath arises from the fact that the lungs will not fully deflate and are accordingly in a state of partial inflation even after the breath has been expelled. Chest pains and a cough ordinarily are evident, and expectoration of blood may appear later on.

So far as appearance goes, the victim is usually unaffected until the third stage, or until tuberculosis sets in. Usual evidence of bodily illness, such as paleness, loss of weight, and loss of muscular development are frequently entirely absent until the disease is far advanced. The only known dependable means of ascertaining the presence of silicosis in its earlier stages is by use of the X-ray, which reveals changes that have taken place in the lungs.

Dust in Rock Drilling

The drilling of all rock that contains a considerable amount of free silica, or quartz, exposes all persons in the vicinity to the dangers of silicosis. Experience shows that men may breathe with comparative safety air containing 20,000,000 particles per cubic foot of 30% free silica dust, but that it is dangerous for them to breathe air containing more than 5,000,000 particles per cubic foot of 90% free silica dust. These so-called permissible concentrations are greatly exceeded under practically all drilling conditions in silica-bearing rock, even when the work is carried on in open air. Tests of the air in open cuts in New York City while drilling was in progress have shown dust counts per cubic foot ranging from 1,500,000 to 750,000,000 particles. When 208 workmen in New York City excavations were examined, 118 of them, or 57%, showed evidences of silicosis. Seventy-two of these men had worked only in uncovered sites.

As previously noted, the respiratory organs are fitted with an efficient dust trap and this serves to prevent the larger particles from entering the lungs and to expel probably half the smaller particles that do reach the lungs. The nose, pharynx, trachea, and other organs through which the air passes are equipped with moist membranes which arrest the progress of the dust, and with delicate hairs which, in some cases, wave it back along the passages through which it entered. As the breath travels towards the lungs, particles of increasingly smaller size are barred from further progress. It is highly probable that particles



Left: Drill after operating for a few seconds without a dust collector. Right: Dust collecting hood with drill in operation. Dust stream is clearly shown coming from the drill hole into the hood

larger than 10 microns in greatest dimension (a micron is approximately 1/25,000 in.) reach the lungs, and it is likely that by far the greater portion of those larger than 5 microns are captured before they get that far. The great danger, therefore, is from the exceedingly minute particles. These are so small that those less than 10 microns in diameter are invisible to the eye if present in numbers less than 30,000,000 to the cubic foot. They are so light, in fact, that there are approximately a million million of them in a gram, and a million of them weigh less than 0.0000011 lb. Particles of 1-micron size will float indefinitely in still air, and it requires several hours for those of 5- and 10-micron sizes to fall a few feet in still air. Any agitation of the air such as is always present out of doors will immediately put them in suspension again.

Prevention

There is no known cure for silicosis. On the other hand, it is of itself seldom fatal. The real danger is that the lungs, in their weakened condition, will become favorable ground for the incubation of tuberculosis germs. When silicosis sufferers contract bronchitis in cold weather, the breathlessness increases and the heart is sometimes affected. If the silicotic condition is at the bottom of the lungs, the victim is rendered increasingly susceptible to pneumonia.

The only effective protection against the dangers of silicosis infection is to prevent workmen from breathing air that is laden with silica dust beyond a safe point. Wet drilling, while helpful, is not an adequate safeguard. Water allays the larger particles of dust that are visible to the eye and thus ostensibly produces the desired effect. Actually, however, it fails to trap the microscopic particles which are the source of the real danger. Positive protection can be secured only by providing some means of removing the finer dust from the breathing zone or by supplying workers with breathing air from outside the danger zone. The latter method is exemplified by the helmet and respirator which the sand blaster wears. Obviously, it is impractical and unwise to attempt to enforce the wearing of such cumbersome and uncomfortable equipment by all the men working around rock drills. It follows, then, that the sole effective precaution is the application of some method of removing the dust down to a safe hygienic limit. More than 20 different devices intended for this purpose have been patented in the United States, but until recently none of them proved successful under commercial working conditions. Within the past year or two one apparatus for capturing the dust at the collar of the drill hole and leading it away from the breathing zone of workmen has given satisfactory performance on excavation work in New York City. More will be said of it later.

Regardless of the ultimate methods that are adopted to cure silicosis, quarrymen are right now faced with a situation which they can not well ignore. It is highly probable that they will be better off when legislation is enacted and their liabilities are definitely known. Until their position is defined and legal means are provided whereby they can adequately protect themselves against litigation, they are in a somewhat precarious spot. Unfortunately, the present absence of such legal determinative measures lends itself ideally to the machinations of unscrupulous lawyers and doctors and provides all the elements for racketeering.

As a matter of fact, the movement has already well started, as is attested by the following quotation from the September 2 issue of *Business Week*: "At the completion of a 3-mile tunnel in West Virginia recently, 200 damage suits aggregating $4,000,000 were filed against the contractors. Suits totalling over $30,000,000 have been brought against upstate New York foundries in the last year or so. Damage litigation now pending probably totals more than $20,000,000 and $100,000 claims are being entered now instead of for smaller amounts as in earlier days. Employers don't know what to do.

"The disease (silicosis) has been recognized for 20 years, but there is no known cure. Canada has placed it on the compensation list. South African mines are compelled to care for employees who contract the disease. But it has not been made legally compensable in this country, since it is not an accident and insurance does not cover. State liability laws also lack uniformity, which makes it worse.

"Now suddenly there is an epidemic of lawsuits, induced in part by growing realization among workers of the silicosis menace and in part by legal racketeers who have been stirring up trade on a contingent basis by getting workmen to lodge complaints against employers. The first trial in the West Virginia suits ended in a hung jury after 6 weeks. One man who sued had worked 2 days. One was a water boy who had never worked in the tunnel."

That the contracting trade fully realizes the gravity of the situation is evident from the following excerpt from an editorial which appeared in *Engineering News-Record* of February 3: "Silicosis is recognized as a compensable disease in only one or two states; it should be so recognized in every state. Until then the contractor will be at the mercy of the courts in settling damage suits. It is desirable also that the law should state how silica dust is to be controlled and should distinguish between silicosis and ordinary respiratory diseases. An example of what not to do is presented by a bill recently introduced in one of the state legislatures, which though intended to deal with silicosis, uses the term 'pneumoconiosis,' under which term, medical men say, a contractor might be liable for any respiratory disease, including pneumonia. Because of the danger of such confusion under any law, moreover, the review of silicosis cases should be entrusted

only to the hands of a competent medical board.

"It is apparent that in the threat of silicosis the construction industry is faced by a new and wholly unfamiliar problem, and one whose satisfactory solution depends upon intelligent action. Labor organizations and legislatures already have taken the problem in hand; contractors should coöperate heartily. If they ignore or fight the effort to bring silicosis into recognition, they may soon find themselves in a bad situation. But if they recognize the problem and give the time and effort necessary to its sane solution, the specter of silicosis can soon be banished."

Need Cooperation of Several Industries

From the foregoing, it can be seen that the problem of how to deal with silicosis is not the concern of the quarrying and stone-working industries alone. In whatever steps they take, they can count upon help from the mining, contracting, and foundry industries. Any legislation that is framed will have to consider silicosis from the standpoint of all these fields; and representatives of all the industries concerned will, in turn, best serve their own interests by coöperating among themselves to insure that such legislation is equitable to one and all.

This discussion has assumed the position that all quarrymen are concerned with the silicosis problem. That is, of course, not strictly true. Limestone, marble, dolomite, and certain other rocks contain no free silica, or contain it in such small amounts that it can be disregarded. Nevertheless, there are numerous law suits pending brought by workers in such quarries. On the other hand, quartzite is virtually all silica, sandstone is in almost the same category, depending upon its purity, and granites, gneisses, schists, and traprocks contain high percentages of free silica.

In 1929 the U. S. Public Health Service published the results of an investigation into the health of workers in the granite industry (Public Health Bulletin No. 187). This inquiry developed the fact that most of the workmen were exposed to an average of 60,000,000 particles per cubic foot of dust less than 10 microns in greatest dimension. The dust contained 70% total silica and 35% quartz or free silica. Almost all the workers of 20 years' occupation were found to be suffering from silicosis in some stage and a large proportion of them had developed tuberculosis. The Government investigators expressed the opinion that dust of the size present would be hygienically safe if the number of particles was reduced to from 9,000,000 to 2,000,000, to the cubic foot.

It is fairly well established that most of the fine dust originates from drilling. Blasting causes wide dissemination of damaging dust, but most of it is very probably dust that was caused by the drilling. The crux of the problem, therefore, would seem to rest in the determination of some efficient method for removing enough dust during drilling operations to reduce the concentration to within safe health limits. This has been the aim of virtually all devices that have been brought forward, among them the one which was previously mentioned as having been successfully applied on foundation work in New York City.

Kelley Dust-Removal Apparatus

This apparatus has been developed by George S. Kelley, mechanical engineer for the George J. Atwell Foundation Corporation. It has undergone four years of development, both in the laboratory and on actual jobs. The Metropolitan Life Insurance Co. has displayed interest in it and the drilling incidental to the removal of rock for the foundations of its new building on Fourth Ave. in New York City was all subject to dust control by this method. A total of 404 tons of dust was withdrawn from the breathing zone of the drillers and captured. John D. Rockefeller also has watched with personal interest the progress made towards the alleviation of silicosis and through his efforts all the drilling for the foundations of Rockefeller Center has been conducted with the Kelley system of dust control in operation.

The Kelley system utilizes exhaust air to withdraw the dust from the collar of the drill hole. The dust is captured in a hood through which the drill steel passes and is led off through a 2-in. hose to a collector, where it is taken out of the air by a 2-stage process of separation and filtration. After such treatment, the air is well below a dust concentration of 10,000,000 particles per cubic foot of particles less than 10 microns in greatest dimension. Thus far, collectors have been developed in three sizes, suitable for one, five, or ten jackhammers. The source of suction is either an air ejector run off the compressed air line to the drills or, in the case of the larger units, a blower.

One important point developed on the Rockefeller Center work was that the use of the apparatus materially reduces drilling costs. Keeping the drill hole free from dust permits the bit always to work against a clean rock face, thereby increasing its cutting speed. The absence of dust also lessens side wear on the bit with the result that it does not lose gauge as fast as normally. The combination of these influences produces faster drilling and reduced sharpening costs. Careful tests were conducted by drilling half of an excavation plot with the dust hoods operating and half of it without them in use. Every item of cost was checked and it was found that drilling expense was decreased approximately 25%. The drilling was all done with jackhammers and downholes predominated.

There is, then, the promise of this apparatus and of any others which may be developed and while quarrymen will be faced with the necessity of making a capital outlay for such equipment, they may find it will at least partially pay for itself through the economies it effects.

Until such dust-removal equipment is approved by the health authorities and by the insurance companies which underwrite industrial policies, it would seem that the best course of quarrymen would be the exercise of caution. Periodical examination of all workers subjected to the dust hazard and removal to other work of all those who show evidence of affection would appear to be the wise course. While there is no known cure for silicosis, first-stage victims generally do not grow worse if they are taken out of the dusty zone and, since their capacity for work is not affected, they can be transferred to other jobs with no loss in their efficiency. Only by rejecting applicants for work who show symptoms of the disease and by eliminating from the zone of unhygienic dust concentration those who definitely have contracted it can quarrymen safeguard themselves against possible damage suits which profit-seeking lawyers are very willing to handle on a contingent-fee basis.

As previously intimated, also, it would seem to be prudent for quarrymen to interest themselves in state legislation designed to curb silicosis and to define the benefits which victims may receive. Only in this way can they be assured that the laws passed will be equitable to them and to their employees. Several states are right now interesting themselves in this matter and quarrymen can do much to help direct investigations along lines that will produce legislation based upon intelligent understanding of the problems at hand. Snap legislation will only make a bad situation worse. By lending their facilities and coöperating in studies, they can guard against the enactment of laws which reflect only a casual knowledge of the subject and which will, most certainly, prove inadequate and which may impose undue and costly regulatory measures and restrictions upon quarry operators. Before enacting any legislation, each state should conduct a thorough investigation of the silicosis problem from all angles. Quarry operators should take an active part in seeing that no laws are passed in their states until the legislators have before them the facts that will enable them to act intelligently.

New Light on Silicosis

IT IS CLAIMED by Dr. William R. Jones, D.SC., D.I.C., F.G.S., M.I.M.M., that the dreaded disease of silicosis is not due to free silica as the law at present assumes, but to a silicate of potassium and aluminum, viz., sericite. [Sericite is a variety of muscovite, which is a mica, a potassium silicate.]

In a paper published in the August issue of the *Journal of Hygiene*, entitled "Silicotic Lungs: the Minerals They Contain," he describes how he obtained the mineral residues free from organic material, examined them under the petrological microscope, analyzed the ash and the mineral residues of

silicotic lungs. He describes sericite, its chemical and physical characters and mode of occurrence, compares those silica rocks which cause silicosis with those that do not, and finally concludes that the bulk of the mineral residues obtained from every silicotic lung investigated by him, consisted of minute fibres of the mineral, sericite, a hydrated silicate of aluminum and potassium known also as "secondary white mica."

Further, that silica in the uncombined state, as quartz, is also present, but in amounts subordinate to sericite; especially is this so with regard to the small number of quartz particles, as compared with the countless fibres of sericite.

Silica in the uncombined state, as quartz, is not the chief cause of silicosis in these and certain other cases.

He finally submits that it is mainly the presence in exploited rocks and materials of *fibrous* minerals, be they sericite, sillimanite, tremolite, etc. (or a fibrous form of free silica as in chert or of a fibrous rock as in pumice) in aggregates which, during the impact of drilling, blasting, or crushing, become freed into the atmosphere as individual fibres, that enable sufficient material in course of time to enter the lungs to cause silicosis. He says, however, "It is not suggested that sufficient minute particles of quartz could not, under any circumstances whatever, enter the lungs to cause silicosis, although the cases investigated appear to show conclusively that they have not done so; but it is maintained that the fibrous minerals hasten the process so very considerably that their presence in the exploited rocks and materials is of far greater importance in causing this disease than is the presence of quartz."—*Quarry Managers Journal (Great Britain).*

Prevention of Silicosis in Plants

THE EFFECTIVE METHOD of prevention depends upon the particular operation giving rise to silica dust, says a booklet on "Silicosis" just issued by the Industrial Health Section of the Metropolitan Life Insurance Co., from which the following paragraphs are taken. In general, however, preventive measures include segregation of dust-producing operations; dust control; ventilation; protective devices; good housekeeping; and medical supervision.

Segregation: Dust-producing operations, wherever possible, should be housed in separate departments or buildings, or completely enclosed within a department. Usually this can be done without loss in efficiency, thus limiting the exposure to a minimum number of workers. Workers engaged in non-dusty operations, and even office workers, are often needlessly exposed to as much dust as though engaged in the dusty operations, owing to failure to segregate dusty processes in a proper manner.

Dust Control: The application of localized effective exhaust ventilation, whenever practical, is undoubtedly the preferred method of control. The dust should be exhausted as near as possible to the source of origin and always in the direction away from the breathing level of the worker. Many operations, such as crushing, sieving, polishing, cleaning and conveying, can be almost completely enclosed, and exhaust ventilation may be applied to the inside of the enclosure.

Dust exhaust systems, however efficient when first installed, are apt to deteriorate unless periodically and frequently inspected. The situation here is precisely similar to that pertaining to safety devices. It is not at all uncommon in making plant surveys to find expensive installations of dust exhaust machinery rendered more or less useless by mechanical defects that have developed or by having rags or wastepaper stuffed in their intake ducts. Exhaust systems require intelligent supervision, and this should be a definite responsibility as in accident prevention. The efficiency of dust exhaust systems should be checked by a dust count when first installed and rechecked from time to time thereafter.

Water applied at the point of origin may be of value in controlling dust. While useful in many processes, it is not always to be relied on, and its use, especially in grinding, may do more harm than good. Willis contends that moisture resulting from the use of water may facilitate the spread of tuberculosis. In any event, dust counts are the only reliable evidence that the process using water is being adequately safeguarded.

Ventilation: It is not possible to generalize in regard to ventilation in dust control. Each case is a problem to itself. Where there is considerable silica dust in the air, which cannot be controlled at its point of origin, it may be desirable to lessen the hazard by diluting the dust, so to speak, by the introduction of large volumes of air by means of a mechanical ventilating system. Mechanical ventilating systems should not interfere with local dust-exhaust systems; dust may be carried inadvertently from the process where it arises to other parts of the plant, thus needlessly exposing other employes.

Protective Devices: Among the devices designed for the protection of the individual worker against dusts, by far the most important is the positive pressure respirator. In particularly dusty operations, such as sandblasting and metal grinding, where the particles may injure the face, the helmet type of respirator is preferred. Whatever type of air mask is worn, it is essential that the apparatus be provided with an adequate air supply drawn from a pure, dust-free source. Some authorities recommend as much as six cubic feet per minute, while others are of the opinion that respirators constructed on modern principles are efficient when used with but one or two cubic feet of air per minute. The source of air supply is equally important. The mistake is frequently made of taking the air directly from a compressed air line without providing the air intake to compressors with a filter capable of removing the fine dust particles. Sometimes the air of the compressed air line is wet and oily and there may be a possibility of carbon monoxide poisoning due to oil being partially burned in a reciprocating piston-type compressor. The air, under these conditions, is unsuited for use in the respirator and it becomes necessary to install a small rotary compressor or blower, supplied from a clean source of air. This latter method is applicable particularly to plants not equipped with compressed air.

Respirators should be selected for their comfort to the wearer and for their protective efficiency. The manufacturer should be required to submit a laboratory report of the efficiency of his device, for the purpose selected.

Although respirators should never be regarded as substitutes for local exhaust ventilation, they provide a practicable means of protection for workmen engaged in dusty operations carried on only occasionally or for short periods of time. The positive air pressure type of respirator, unfortunately, cannot be worn by workers engaged in operations requiring freedom to move about unhampered by air hose. The only available protection for the worker under these conditions is to wear a respirator with a filtering medium of fibre or tissue. Only those types which have been demonstrated to possess the necessary filtering medium to give sufficient protection against fine dusts should be selected.

Good Housekeeping: Orderliness and cleanliness, insofar as practicable for the type of work conducted, are important factors in dust prevention. For cleaning, safety and efficiency, floors should be of concrete, wooden blocks, granite, or other impervious material. Sweeping should be done wet and at the end of the shift. Walls, overhead structures and equipment should be cleaned whenever possible by means of a good vacuum system. The use of the air hose for cleaning by blowing should be prohibited. An important feature of good housekeeping is the maintenance of equipment, as mentioned under exhaust systems. A responsible person or persons under the supervision of the management should be assigned the task of inspecting equipment regularly and of supervising housekeeping conditions.

Medical Supervision: Any effective program of preventive work in industry must include the individual workman. An essential requirement where silicosis is a hazard is that physical examinations of workmen should be made prior to employment and at regular intervals thereafter. The initial examination is for the purpose of protecting

the applicant who has physical defects, which may make him more than usually susceptible to injury from silica dust, against the risk of engaging in work which will further endanger his health; also it is advisable to protect employes engaged in dusty work from possible contact with an individual who may have tuberculosis. For persons who already have silica-damaged lungs, contact with a case of open tuberculosis is a very serious risk. The periodic examination is an indispensable preventive measure which enables the physician to detect diseases of the lungs in their early stages and at a time when removal of the worker from the dust offers hope of recovery or improvement.

Plant Surveys

The method of conducting a survey of an industrial plant in which there is a question of a silicosis hazard is briefly described as follows. This method has been followed by the United States Public Health Service in its studies and by other institutions, including, to a limited extent, the Metropolitan company's industrial health section, through which certain studies have been made at the request of group policyholders.

A visual inspection of the plant is made by an industrial hygienist, the location of processes producing silica dust is noted, and the environmental conditions are carefully studied. Dust samples are taken by a specially trained technician, using the impinger, at the breathing level of the employes exposed. This is done at various times during the shift, and on different shifts if more than one shift is being worked. Dust samples are taken also at other locations where the nature of the plant layout may indicate that dust may be carried by air currents. The dust samples are sent to the laboratory and analyzed for the determination of silica present and for the enumeration of particle counts per cubic foot of air. Physical examinations are made of employes engaged on dusty processes, including X-ray of chest, and careful note is made of the length of time engaged on dusty processes in present or other industries.

The information obtained from physical examinations and from dust sampling is correlated and the facts presented in an integrated manner. It is thus possible to determine whether or not there is an appreciable hazard, and, if the hazard is present, its severity, as evidenced by length of time individuals have been exposed before showing typical effects. Recommendations are made for the control of the hazard by the various means previously described.

Silicosis and Other Pneumonioses

CONCLUSIONS regarding silicosis and tuberculosis taken from a paper on the above subject by Dr. Albert E. Russell, chief surgeon, U. S. Bureau of Mines, at spring meeting of the Portland Cement Association, May 16, 1933, include:

(1) Inorganic dust produces more pulmonary damage than does dust of organic origin.

(2) Stimulation of the development of silicosis is due primarily to the chemical or bio-chemical and not the mechanical effect of silica dust.

(3) Silicosis is caused almost entirely by dust containing not less than 35% of the crystalline variety of SiO_2 (quartz).

(4) The deleterious effects of this dust are caused by particles, 10 microns or less in diameter, and a concentration of not less than 20 million particles to the cubic foot.

(5) It is not reasonably to be supposed that cement workers would develop silicosis to any great extent, since the highest silica content in cement mill dust discovered by Dr. Russell in his studies was only 6.5%, found near the crusher. Even where the analysis of cement or dusts found in cement mills indicates a total percentage of silica (silicates and free silica) as great as 20%, the harmful crystalline variety to above (quartz) is rarely found in quantities in excess of 1%.

(6) Since they do not have marked silicosis it is not surprising that cement workers do not show excessive rates of tuberculosis.

(7) The amount of calcium in relation to silica or other constituents of inhaled dust appears to be of importance in the incidence and development of industrial tuberculosis. In the cement mill study no new cases of tuberculosis were found to have appeared as a result of exposure to cement dust; the cases which had unmistakable evidence of arrested tuberculosis exhibited no tendency to reactivation of the disease. Therefore, we are led to believe that exposure to dust generated in the manufacture of portland cement is not provocative of tuberculosis nor is it a factor in the reactivation of arrested tuberculosis.

(8) It would be a great aid in the amelioration of dust hazards if it were possible to render a harmful dust inert by mixing with it one which had proved to possess antisilicotic properties. Certain mixtures of dusts may be capable of such effects, but much experimentation and study is needed along this line to establish proof that such a procedure is feasible.

Canadian Government Fights Silicosis of Miners

THOUSANDS of lives will be saved and mining costs will be greatly reduced by the development of a means of preventing silicosis credited to Dr. F. G. Banting, the discoverer of insulin, according to a cablegram to *The Toronto Evening Telegram* from its correspondent, W. T. Cranfield, in London.

"Silicosis is caused by the presence in the atmosphere of minute particles of silica, which hitherto have defied all control," said the message. "His device is an ingenious mechanism by which the air is entirely freed of the noxious particles within ten minutes of a blast. It is estimated that silicosis compensation costs one dollar in five in gold production."

The Ontario Hygiene Department, through legislation during the last session, has made special arrangements for compensation for those so afflicted, and provision has been made under the Mining Act for periodical examination of men engaged in work where there is danger of silicosis.

Mines Pay Million

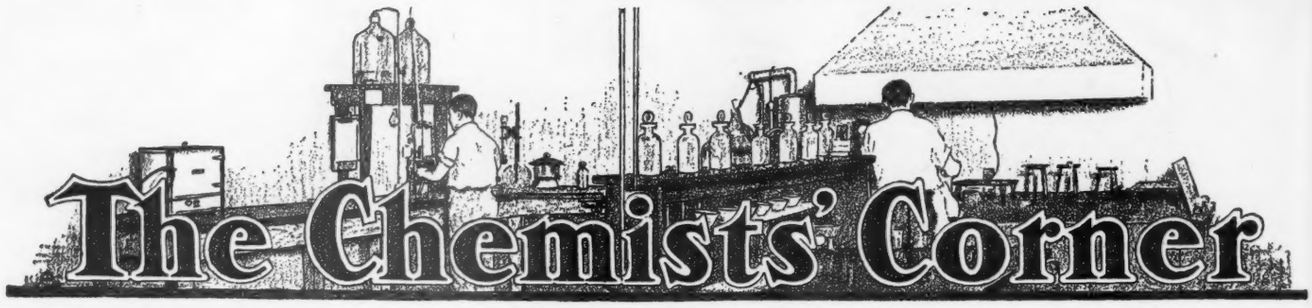
More than $1,000,000 was paid last year to the government by mines on account of silicosis assessment.

The Ontario Mining Association has been assisting in advancing research to eradicate silicosis. It is understood officials of the association have been in communication with Dr. Banting in this respect. British scientists have also been experimenting in attempts to eradicate the disease lately, it is said, with some hope of success.

G. C. Bateman, secretary of the Ontario Mining Association, while declining to comment on the mines' position in the matter, said: "Last year's report from the mines showed heavy assessment on account of silicosis. If the remedy now suggested by Dr. Banting is successful, it will undoubtedly serve to reduce costs."

Barite and Barium Products

THE States Bureau of Mines has issued an annual summary of barite and barium products in 1932, showing a decrease in production compared with 1931 of 37% in the case of crude barite and 26% in barium products. Lithopone, a chemical precipitate containing barium sulphate and zinc sulphide is the principal outlet for crude barite. Since lithopone is used principally as a pigment in paints, enamels and lacquers, the drastic curtailment in building construction and automobile output affected materially the sales of this commodity. The 11 plants in operation in 1932 produced and sold 121,667 tons of lithopone, valued at $10,176,856, which represents a decline of 20% in quantity and 22% in value compared with 1931. Although the floor-coverings and textiles industries consumed about 15% less lithopone in 1932 than in 1931 they used only 47% as much as in 1929. The rubber industry, another consumer of lithopone, likewise felt the economic depression, as evidenced by a decline of 68% in consumption of rubber in 1932 compared with 1929 and of 45% in purchases of lithopone compared with 1929. The barium chemicals industry, which in 1931 showed increases despite general conditions, in 1932 experienced marked decreases in sales. In this group large decreases in sales were registered by blanc fixe and precipitated barium carbonate.



Viscosity of Cement Slurry

Effect of Water Content, Temperature, Storage, Fineness and Lime Content Upon Viscosity of Slurry

By Katsuzo Koyanagi,

Chichibu Cement Co., Ltd., Tokyo, Japan

FOR WET PROCESS cement plants which have neither slurry filters nor very long kilns (the greater part of the cement plants in the world) it is extremely important to make the water content of slurry as low as possible to obtain better fuel economy.

One of the difficulties encountered in making water content of slurry low is that slurry pumps cannot handle slurry with over a certain limit of thickness or viscosity.

It is generally known that the viscosity of slurry is very much affected by water content, temperature, storage, fineness and lime content, but the relation between these has not yet been made clear.

The writer undertook an exhaustive study of effect of aforementioned factors upon viscosity of slurry, the results of which are given herewith.

During the period of experiments, the flue dust was not added to the raw materials, because the flue dust has some hydraulic property and affects the viscosity of slurry so much that it is impossible to determine the effects of other factors.

Raw Materials and Viscosimeter

Analyses of raw materials used in the experiment were:

Limestone.		Clay (shaly clay).
SiO_2	0.43%	64.34%
Al_2O_3	0.25%	13.98%
Fe_2O_3		4.20%
CaO	55.28%	3.60%
MgO	1.33%	1.80%
Ig. loss	43.46%	8.99%

The apparatus used for measuring viscosity is illustrated in Fig. 1. One liter of slurry is poured into the upper vessel, and by opening the valve, it flows into a measuring flask of 200 c. c., and the time in seconds to fill up just 200 c. c. is read. This is the relative viscosity of the slurry. The time for water at 24 deg. C. to fill 200 c. c. was 16 seconds flat. Error in repeated readings was 1/10 sec. in the case of water. The highest relative viscosity of slurry at which the Wilfley pump with 5 in. main transporting pipe, 340 ft. long, head 24 ft., just fails to pump, was determined after many experiments to be about 180 sec.

Water Content and Relative Viscosity

It is a matter of course that the lower the water content the higher the viscosity becomes. The writer found that there is a fixed relation between these. To a thick slurry water was added and the mixture made gradually thinner; and by measuring the relative viscosity and water content of slurry of various thicknesses a water-viscosity curve was drawn, an example of which is in Fig. 2. The empirical formula of this curve was calculated. In Table 1 the actual readings and calculations are given for comparison.

If S and $\frac{S-17.4}{48.04-W}$, or $(S-17.4)$ and $\frac{S-17.4}{48.04-W}$ are plotted on a coördinate paper, the line connecting these points makes a straight line. This shows that the water-viscosity curve of Fig. 2 is a hyperbola of the empirical formula with three constants. The equation of the curve can be calculated from Table 1 by using the method of averages and is:

$$(S-14.10)\ (W-36.47)=38.22$$

If the values of S, which are obtained by measurement, are inserted in the above equation, and W is calculated, the calculated values of W coincide with the measured values quite well, as shown in Table 1.

Effect of Temperature on Viscosity

It is a well known fact that in the measurement of viscosity of oil, the temperature is the greatest factor which affects the viscosity, but quite unknown is the effect of temperature upon the viscosity of cement slurry.

The temperature of slurry is different in different parts of the cement plant; it attains a maximum at the outlet of the grinding mills, 60 deg. to 70 deg. C. This temperature is less in the storage tanks, and when slurry reaches the kiln feed tank of a ro-

TABLE 1—COMPARISON OF OBSERVED RELATIVE VISCOSITIES AND CALCULATED VICOSITIES

	Readings		Calculation				
Nos.	S Rel. viscos. in seconds	W Water in per cent	$(S-17.4)$	$(48.04-W)$	$\left(\frac{S-17.4}{48.04-W}\right)$	W calc. (out of formula)	ΔW (error)
1	17.4	48.04	0.0	0.0	0.0	48.05	— 0.01
2	18.0	46.01	0.6	2.03	0.2956	46.27	— 0.26
3	19.2	44.28	1.8	3.76	0.4787	43.96	+ 0.32
4	21.4	41.62	4.0	6.42	0.6231	41.71	— 0.09
5	23.5	40.52	6.1	7.52	0.8111	40.54	— 0.02
6	26.7	39.53	9.3	8.51	1.0928	39.50	+ 0.03
7	29.3	38 99	11.9	9.05	1.3149	38.98	+ 0.01
8	31.9	38.66	14.5	9.38	1.5458	38.62	+ 0 04
9	35.0	38.32	17.6	9.72	1.8107	38.30	+ 0.02
10	40.7	37.94	23.3	10.10	2.3069	37.91	+ 0.03
11	47.4	37.68	30.0	10.36	2.8957	37.62	+ 0.06
12	58.6	37.46	41.2	10 58	3.8752	37.33	+ 0.13
13	71.4	37.23	54.0	10.81	4.9954	37.14	+ 0.09
14	94 4	37.09	77.0	10.95	7.0320	36.95	+ 0.14
15	141.7	36.82	124.3	11.22	11.0754	36.77	+ 0.05
16	180.7	36.66	163.3	11.38	14.3497	36.70	— 0.04
17	208.8	36.55	191.4	11.49	16.6580	36.67	— 0.12

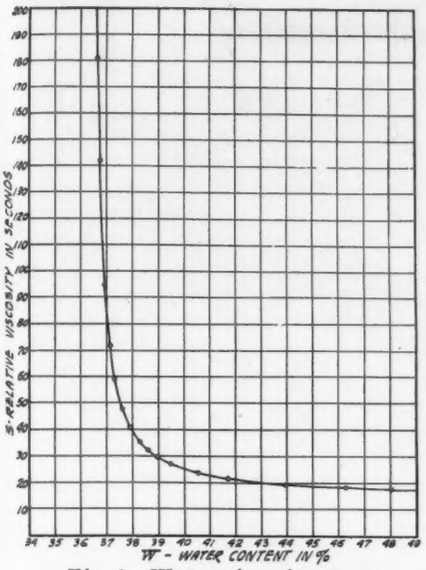


Fig. 2—Water-viscosity curve

tary kiln, the temperature stands ordinarily 20 deg. to 30 deg. C.

The writer measured the relative viscosity of a slurry at 24 deg., 40 deg. and 70 deg. C., respectively. Fig. 3 shows the water-viscosity curves of a slurry at different temperatures.

From this curve it can be seen that the viscosity of slurry is quite different from that of oil. It is not influenced so much by temperature.

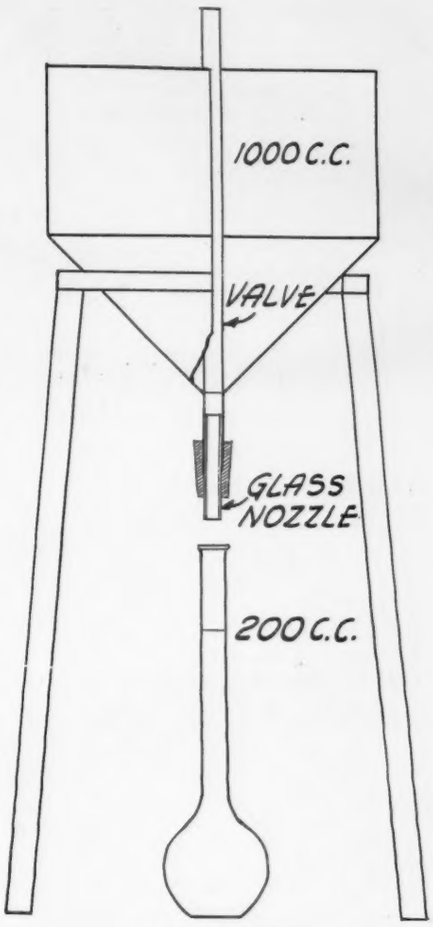
In all the other experiments given, the measurement of viscosity was carried out at room temperature of 24 deg. C.

Effect of Storage on Viscosity

The writer has during his experience with grinding mills often observed that the viscosity of slurry after some period of storage becomes lower than when freshly ground, though its water content remains unchanged. In order to verify this observation the water-viscosity curves of a slurry in freshly ground state and after storage of 38, 52, 76 and 172 hours were made and compared. Fig. 4 shows these water-viscosity curves.

It can be seen that the curves are nearly the same in form and parallel in the upper parts. The viscosity of the slurry is decreased through storage, as plainly indicated. In order to know the exact intervals of these curves at the relative viscosity of 180 sec. (i. e., the high limit of viscosity the slurry pump can handle), the empirical formulae of these curves were calculated as already explained; and values of W, which corresponds to the viscosity of 180 sec., were obtained from the formulae. Table 2 shows the empirical formulae and the water contents.

Fig. 1



Viscosity Guage

If now the periods of storage (H) and water content corresponding the viscosity 180 sec. (W) are plotted on rectangular coördinates, the line connecting the points makes a curve shown in Fig. 5. The empirical formula of this curve can also be calculated. The calculation is given in Table 3.

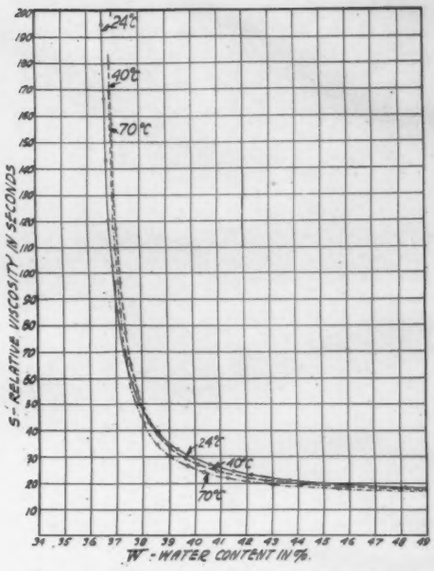


Fig. 3—Water-viscosity-temperature curves

If H and $\frac{H-4}{40.13-W}$ or $(H-4)$ and $\frac{H-4}{40.13-W}$ are plotted on coördinate paper, the line connecting the points makes a straight line, which proves that the curve in Fig. 5 is a hyperbola, the equation of which can easily be calculated by method of averages from the numbers given in Table 3. The equation is:

$$(H+10.93)\ (W-35.49)=69.18$$

W calculated from this equation coincides the measured value of W quite well, as shown in Table 3.

From these experiments it is seen that the slurry which is so viscous when freshly ground that a slurry pump fails to pump it, after a storage period of some days, can be pumped by the same pump without difficulty.

Effect of Fineness on Viscosity

Samples of slurry of various finenesses were prepared from a raw mixture of which lime content was 77% $CaCO_3$, by grinding in a test mill for different lengths of time. The finenesses of the slurry were as follows:

Nos.	Fineness (residue % on a sieve 4900/sq. cm.)
1	0.82
2	4 62
3	7.88
4	10.87
5	14.35

TABLE 3—CALCULATION OF CURVE FORMULAE

H = periods of storage in hours.
W = water content in % corresponding viscosity 180 sec.

Nos.	H	W	$H-4$	$40.13-W$	$\frac{H-4}{40.13-W}$	W (cal.)	ΔW (error)
1	4 hr.	40.13%	0	0	0	40.12%	+ 0.01%
2	38 hr.	36.90%	34	3.23	10.5263	36.90%	— 0.00%
3	52 hr.	36.60%	48	3.53	13.5977	36.59%	+ 0.01%
4	76 hr.	36.33%	72	3.80	18.9474	36.29%	+ 0.04%
5	172 hr.	35.85%	168	4.28	39.2523	35.87%	— 0.02%

TABLE 2—RELATION OF AGE AND WATER CONTENT TO VISCOSITY

Nos.	Periods of storage H	Empirical formulae of water-viscos. curves	Water content corresponding to viscos. 180 sec. W
1	4 hr.	$(S-12.87)\ (W-39.79)=56.95$	40.13%
2	38 hr.	$(S-11.53)\ (W-36.43)=79.68$	36.90%
3	52 hr.	$(S-11.99)\ (W-36.16)=74.29$	36.60%
4	76 hr.	$(S-11.70)\ (W-35.87)=77.74$	36.33%
5	172 hr.	$(S-10.92)\ (W-35.37)=80.49$	35.85%

The slurries were stored for three days after grinding, and their water-viscosity curves were plotted as in the preceding instances. Fig. 6 shows these curves. Empirical formulae and water contents corresponding to the relative viscosity of 180 sec. for each curve are given in Table 4.

TABLE 4—SHOWING EFFECT OF FINENESS OF GRIND ON VISCOSITY

Nos.	Fineness F	Empirical formulae of the curves	Water content corresponding viscosity of 180 sec. W (cal. from formulae)
1.....	0.82%	$(S-12.57)\ (W-42.08)=45.70$	42.36%
2.....	4.62%	$(S-14.81)\ (W-37.74)=35.23$	37.95%
3.....	7.88%	$(S-14.10)\ (W-36.47)=38.22$	36.70%
4.....	10.87%	$(S-14.28)\ (W-35.74)=35.31$	35.95%
5.....	14.35%	$(S-14.46)\ (W-35.11)=34.90$	35.32%

TABLE 5—LOGARITHMIC RELATION OF EFFECT OF FINENESS OF GRINDING ON VISCOSITY

Nos.	F	W	Log. F	Log. W	W cal.	$\triangle W$
1.....	0.82	42.35	9.91385–10	1.62685	42.36	— 0.01
2.....	4.62	37.95	0.66464	1.57921	37.95	0.00
3.....	7.88	36.70	0.89653	1.56467	36.67	+ 0.01
4.....	10.87	35.95	1.03623	1.55570	35.95	0.00
5.....	14.35	35.32	1.15685	1.54802	35.32	0.00

If now fineness (F) is taken as abscissae and water content which corresponds to the viscosity of 180 sec. (W) is taken as ordinates and points are plotted, a curve as shown in Fig. 7 is obtained. The equation of this curve is calculated as before. When log. F and log. W are plotted on coördinate paper the line connecting the points makes a straight line, which proves that the curve in Fig. 7 is a hyperbola with logarithmic *function*. The calculation is given in Table 5.

The equation of this curve can be obtained from Table 5 by using the method of averages, and is:

$$\log. W = 1.62147 - 0.0635 \log. F$$
$$\text{or } W = 41.83\ F^{-0.0635}$$

W calculated from this equation coincides the observed value of W quite well as shown in Table 5.

From this experiment it can be seen that the viscosity of a slurry increases with increasing the fineness of the grind, and the relation between fineness and water content, which is necessary for a slurry to attain a viscosity of 180 sec. (limit of pumping ability of a slurry pump), can be expressed by a logarithmic function of the hyperbola.

Effect of Lime Content on Viscosity

Some samples of slurry, of nearly the same fineness, but of different content of $CaCO_3$, were taken from a commercial grinding mill. The finenesses and lime contents of the slurry were as follows:

Nos.	Fineness (residue % on 4900/sq.cm.)	Lime content $CaCO_3$ in %
1.....	5.17	59.8
2.....	5.38	68.8
3.....	5.39	77.8
4.....	5.33	86.0

The water-viscosity curves of these slurries were made 24 hours after grinding. Fig. 8 shows the curves.

The empirical formulae of these curves and water content which corresponds to 180 sec.

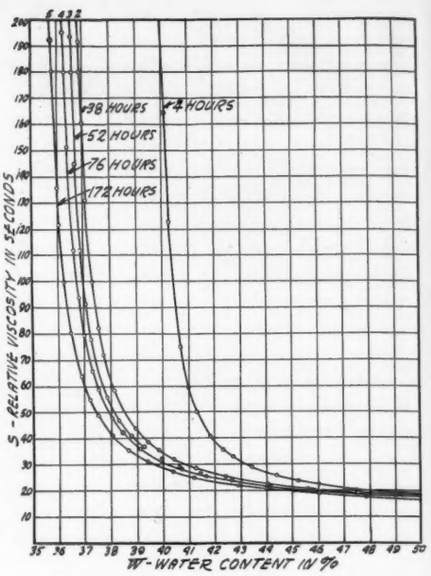


Fig. 4—Water-viscosity-storage curves

viscosity for each of the curves were calculated as before. These are given in Table 6.

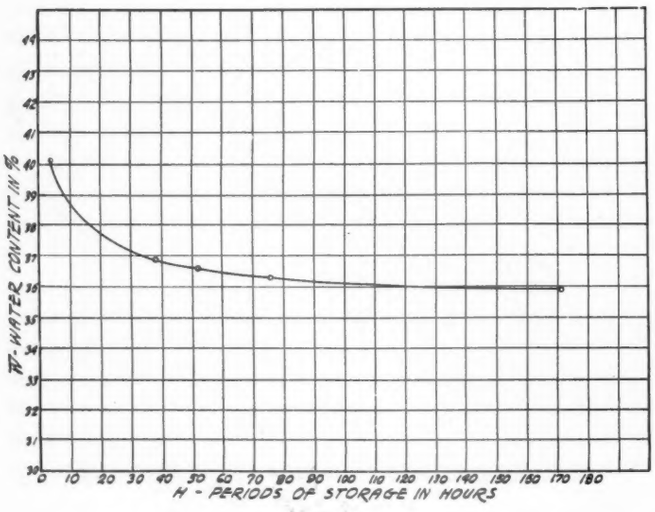
When $CaCO_3$ content (C) and water content (W) in Table 6 are plotted on coördinate paper, we obtain a straight line as shown in Fig. 9. The equation can be calculated:

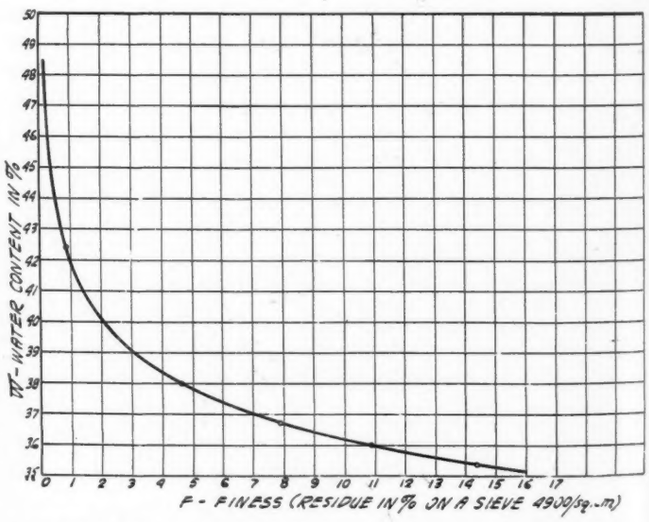
$$W = 48.76 - 0.1545\ C$$

From this experiment it is shown that the viscosity of slurry decreases with increasing $CaCO_3$; i. e., low limed slurry is more viscous than a high limed slurry, and the relation between $CaCO_3$ content and water content corresponding 180 sec. viscosity can be expressed by the equation of a straight line.

Summary

(1) There is a fixed relation between water content and relative viscosity of slurry, which can be expressed by a hyperbolic equation with three constants.





Left: Fig. 5—Water-viscosity-storage data plotted. Right: Fig. 7—Plotted fineness and water content

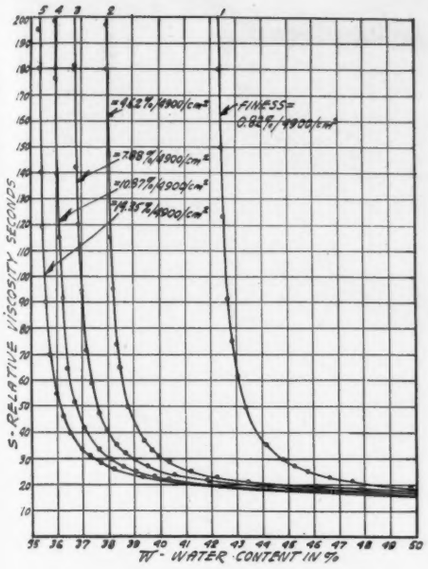


Fig. 6—Viscosity-storage curves

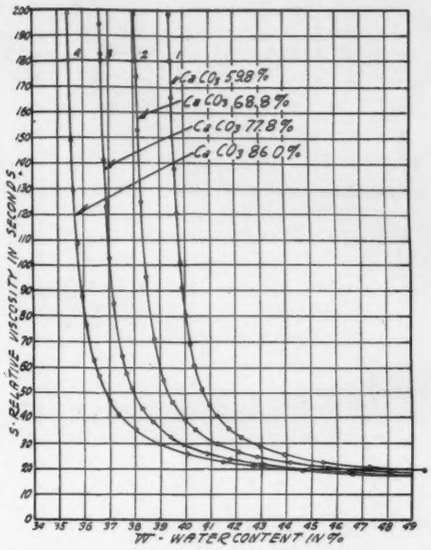


Fig. 8—Various percentages of lime

(2) The effect of temperature on the relative viscosity is quite small, according to tests made.

Effect of Storage

(3) The relative viscosity of a slurry is decreased by storage. The relation between periods of storage and water content which is necessary for a slurry to attain a viscosity of 180 sec. (limit of viscosity for a slurry pump) can be expressed by a hyperbolic equation of three constants.

(4) The relative viscosity increases with increasing fineness. The relation between fineness and water content corresponding to 180 sec. viscosity can be expressed by a logarithmic equation of a hyperbola.

Viscosity Decrease

(5) The viscosity of slurry decreases with increasing $CaCO_3$ content, and the relation between lime content and water content corresponding to 180 sec. viscosity can be expressed by an equation of a straight line.

TABLE 6—EFFECT OF LIME CONTENT ON VISCOSITY

Nos.	Lime content $CaCO_3$ % C	Empirical formulae of the curves	Water content corresponding 180 sec. viscos. (calculated) W %
1	59.8	$(S-13.19)\ (W-39.18)=56.86$	39.52
2	68.8	$(S-13.31)\ (W-37.80)=55.97$	38.14
3	77.8	$(S-12.54)\ (W-36.39)=59.19$	36.74
4	86.0	$(S-12.48)\ (W-35.09)=65.97$	35.48

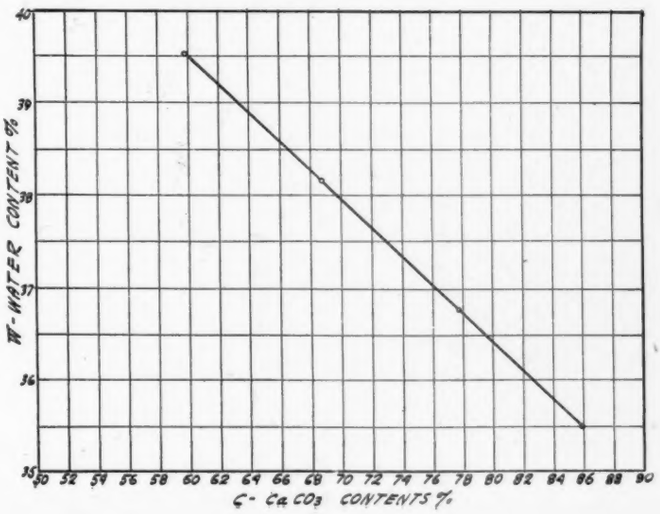


Fig. 9—Lime and water content of slurries coordinated

Road Builders to Convene

THE AMERICAN ROAD BUILDERS' ASSOCIATION has announced that its 31st annual convention and exhibit will be held at the Stevens Hotel, Chicago, during the week of January 22.

At a time when the highway program hangs in balance, the convention is of unusual significance. The Association's national campaign to bring before the public the necessity for a continued highway program will be launched at this winter's convention. The campaign will stress the vital necessity for restricting the expenditure of gasoline and motor vehicle revenues to highway and street budgets.

Assurances already have been received from affiliated organizations and individual members of the national association that every state in the country will be represented.

The convention will bring before the general public the demand for continued participation of the Federal government in the highway program. It is intended to show the public that there still remain 75,000 miles of state highway system roads which never have been improved and that 2,400,000 miles of "mud" roads continue to be the sole outlet for more than 3,000,000 farms. The congestion in municipal centers is proof of the need for arterial highways through such centers and for belt lines around all the larger cities.

Traffic volume increases in recent years have greatly overtaxed the old systems built to cope merely with the demands of a decade or more ago and the question of modernization and widening will be carefully studied by engineers and officials who will meet at the convention in Chicago.

The Road Builders' Exhibit will be held during the convention in the Exhibition Hall of the Stevens Hotel. This will be the first time in many years that the annual road show has been housed under the same roof as the convention and the idea already is proving popular.

Although the spaces are somewhat smaller than in certain other years, the exhibitor will find every facility for presenting the latest developments in his highway construction and maintenance materials and machinery to the assembled engineers, contractors and officials. This type of exhibit will prove unusually popular with the exhibitors who, in keeping with the spirit of the times, are desirous of presenting their products in the most economical manner.

A large number of spaces already have been reserved by manufacturers who are bringing out new developments in low cost roads, and a great many specializing in higher type pavements will be represented. The plan of having the Road Show and convention in the same building will provide a maximum of time for inspection and exhibition.

Hints and Helps for Superintendents

Cableway for Handling Stone in Quarry

At the Cayce, S. C., quarry of the Weston and Brooker Co., a specially designed cableway has been used for many years to lift the stone from the floor of a pit quarry 200 ft. deep and to convey it to the crushing plant. The method and costs of operating the quarry and crushing plant are described by T. I. Weston, president of the company, in U. S. Bureau of Mines Information Circular 6744.

Two full-revolving shovels, 1¾- and 2-cu. yd., load skips on the quarry floor.

The loaded rock is hoisted from the pit and conveyed to the primary crusher by means of two movable cableways swung from stationary masts at the discharge end near the crusher. One mast is 35 ft. and the other 60 ft. high. The opposite end of each cableway across the pit is attached to a movable tower running on a track with a radius of curvature equal to the length of the cableway. Cableway No. 1 is about 900 ft. log, and its tower is supported by standard railroad trucks running on two standard-gage concentric tracks, 37.5 ft. between centers, which the tower bridges. Cableway No. 2 is 800 ft. long, and its tower runs on a single track of 8½-ft. gage that is banked at 8 deg. against the pull of the cable. The main or track cables are 2¼ in. in diameter and are made of single-strand, 91-wire plow steel. Each tower is equipped with an electric hoist for conveying, one for hoisting, and one for dumping the skips. All running cables are of ¾-in. diameter and are made of 6-strand, 19-wire, special steel.

As the hoistman cannot see the skips when they are well down in the pit or on the quarry floor, he is signaled by a flagman stationed near the discharge end of the cableway where the skips are in plain sight at all times.

An interesting feature of the cableway operation is the use of eight-wheel compensating cable carriages, designed and built by the company, that automatically adjust themselves to the constantly varying curvature of the track cables as the skips travel back and forth. Use of these carriages prolongs the life of the track cables considerably by eliminating sharp bends and by distributing the load over eight points.

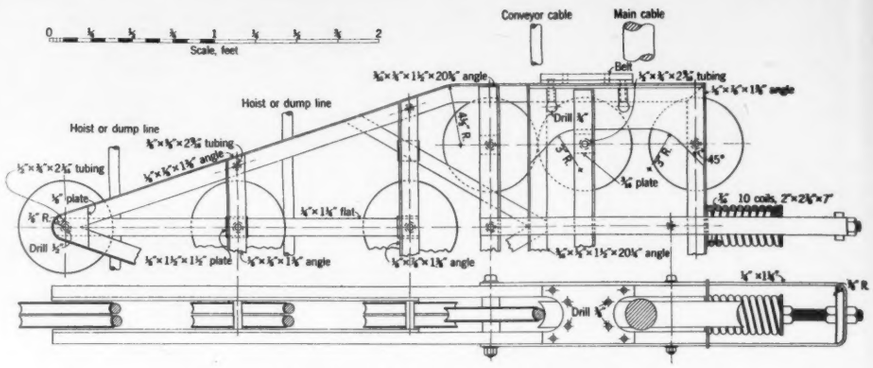
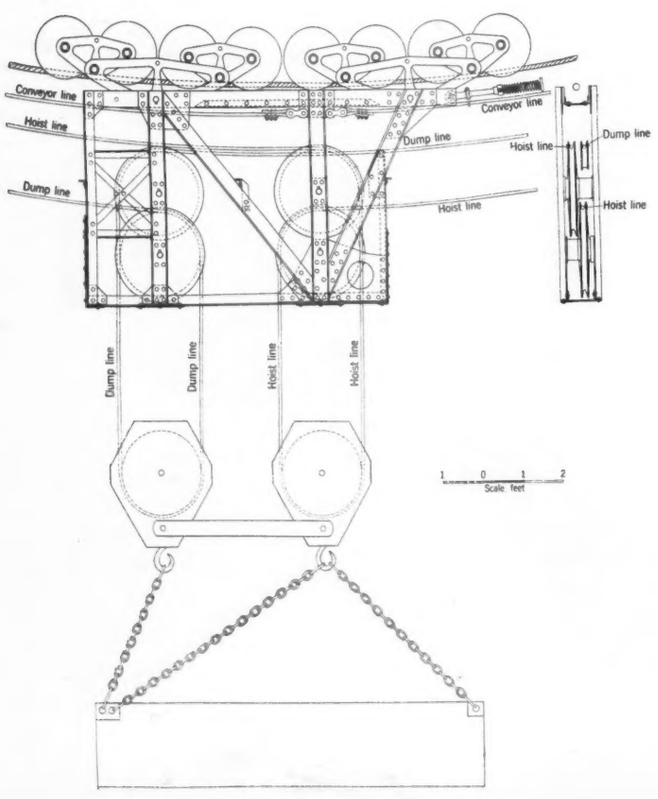
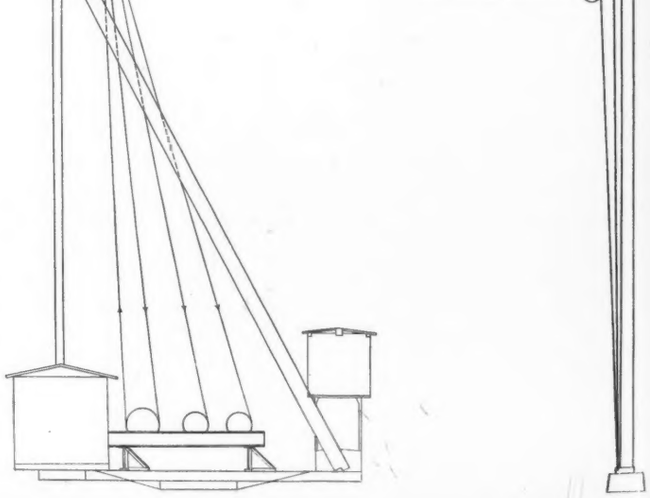
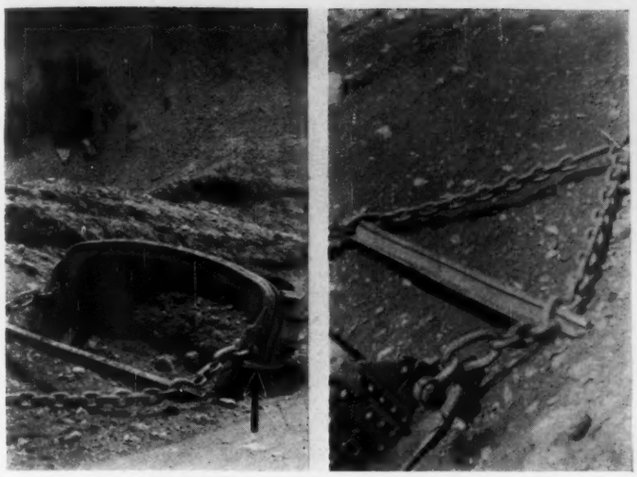


Fig. 2—Sectional diagram of half-speed spacer





Left: Fig. 1—Eight-point cable carriage. Below: Fig. 3—Diagram showing cableway tower, rigging, bridle and lines arrangement



Rail used to relieve strain on drag scraper unit. Extreme left: Clevis protected by welded shaft

A sketch of one of these carriages and its rigging is shown in Fig. 1.

The load on a main cable is made up as follows:

	Weight, lbs.
Carriage	2,500
Skip	4,412
Blocks	1,506
Chains	272
Main fall and dumping line	760
Total dead load	9,450
Live load (rock)	12,000
Total load	21,450

A spacer carriage which supports the hoist, conveying, and dump lines is placed between the skip carriage and each tower. The spacers travel at one-half the speed of the main carriage and are therefore always half-way between the main carriage and the end of the cable. Fig. 2 shows sections of this ½-speed spacer.

Fig. 3 is a schematic diagram showing a section of the tower of cableway No. 1, the rigging of the various hoists and sheaves, the method of attaching the main cable to the mast, and the bridle fastening of the dump and hoist lines. The latter fastening reduces sudden strains on the mast and the lines and converts part of the direct pull into a compressive strain in the mast.

Rope speeds for the cableways are as follows:

	Speed, ft. per min.	
	Cableway No. 1	Cableway No. 2
Hoisting line	127½	125
Dumping line	275	250
Conveyor line	720	900

Oil Storage

THERE are a host of interesting features at the sand and gravel plant at Junction City, Nev., which supplies aggregate for the Hoover dam. Among these features is the care that is given to details.

The lubricating oil storage tanks shown in the illustration hold several barrels of oil each and are of sheet steel, welded joint construction. The tanks are just below a small bank so that the oil barrels can be rolled on top and readily dumped. Each compartment is labeled with a neat sign for identifying the kind of oil in that particular tank.

Such a storage tank not only eliminates a lot of the fire hazard incidental to storage of lubricating oil but saves oil in the long run,

Retrieving a Bucket

By Dare Paris
Monrovia, Calif.

SOMETIMES a drag bucket is hauled back into the pit too far over a cave-in and it is often difficult for the hoist-man to pull it out without breaking the cable or other equipment. By pulling the bucket back a few feet and placing a 4 × 6-in. or similar piece of timber in front of bucket under the chain, as shown in the accompanying sketch, the bucket can be hauled out with little difficulty. This does not apply, of course, to buckets with teeth.

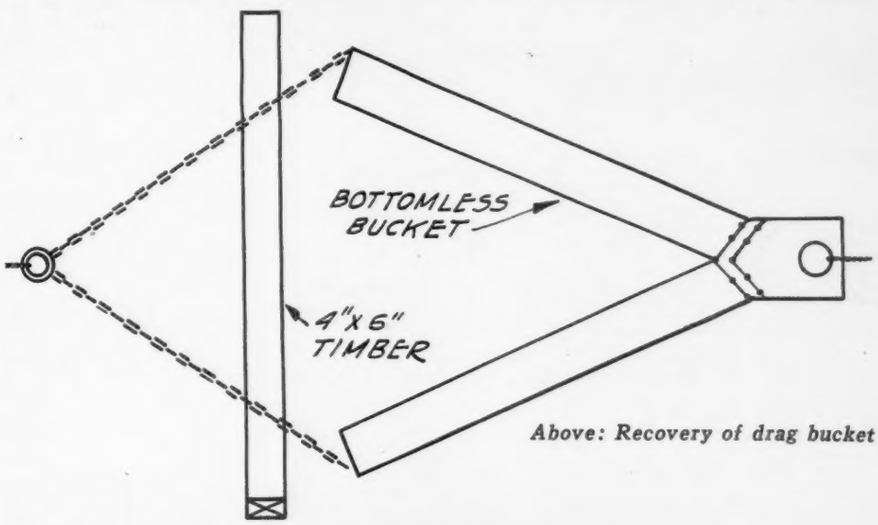
Preventing Side Strain on Drag Scraper

By Dare Paris
Monrovia, Calif.

HERE is a good method for taking the side strain off the front end of a drag scraper.

A spreader is placed two feet ahead of the scraper. This is made from a piece of iron rail which is cut 10 in. longer than the width of the scraper. The ends are trimmed back 5 in. on each end and inserted in the chain link, which is all that is required to hold the rail in place. This arrangement prevents the springing and pulling in of the sides which occur at times in very hard digging and where the pit contains lots of boulders. It also serves to hold the scraper steady when loading.

Note in picture how the clevis is protected from wear by welding an automobile axle or piece of shafting just below.



Above: Recovery of drag bucket

Oil storage units

Annual Conventions of the Mineral Aggregate Industries

WHAT promises to be the largest and most important gathering of producers of crushed stone, sand and gravel and slag, will take place the week of January 22 at the Netherland Plaza hotel, Cincinnati, Ohio. All producers, whether now members of one or more of the three national associations or not, are invited to attend and take part in the meeting.

A busy, interesting and instructive week is in prospect, beginning Sunday, January 21, with meetings of the boards of directors of the National Sand and Gravel Association and the National Crushed Stone Association. The following day, Monday, January 22, the Code Authority for the combined industries will hold its first session. On Tuesday, January 23, and successive days there will be a general meeting of the entire industry and separate sessions of each of the three National Associations—Stone, Gravel and Slag.

"Center of Gravity" of the Industry

Cincinnati is just about the "center of gravity," or the center of production of the industry. Pennsylvania, Ohio and New York in the aggregate produce almost one-third of the crushed stone, sand, gravel and slag of all the states. Cincinnati is a railway center for lines from all directions. Special round-trip rates will be available from all points.

Needless to say, this congress of the mineral aggregate industries is of the utmost significance to all producers. There will be ample opportunity for all to become acquainted with the provisions of the Code and all their implications. There will be an opportunity to exchange operating experiences and for every producer to post himself on all the things that will be demanded of him.

Industrial Democracy

It should be apparent by this time to every producer that this country has embarked on a new era—a tremendous experiment in industrial self government—in which the trade and industrial association will become all important. No producer is too big and none too small to play the role assigned to him. He can do so only by taking an active part in such a congress of his industry as this meeting is bound to be.

There are many problems facing the mineral aggregate industries on which there should be action by the industry as a whole. There is the problem of competition by towns, cities and counties, which at present does not come under the code. There are problems of labor relations. There are problems of cost-keeping and accounting. There are problems of operation. All these will undoubtedly be freely and fully discussed at the Cincinnati conventions during January.

Machinery Men Welcome

While there will be no exhibit of machinery and equipment as at recent conventions of the industry, because it is anticipated that problems in connection with the code will fully occupy the time of all producers, machinery men are invited to be present and to cultivate the friendly relations with producers which have marked these conventions for many years.

Regional Meetings of Aggregate Producers

MEETINGS of crushed stone, sand and gravel and slag producers have been held now in practically all of the 16 regions set up under the Code of Fair Competition in the industry. In some regions, regional associations have been established; in others, as yet only regional, district and state committees have been elected.

Rather than publish incomplete separate reports of these meetings, ROCK PRODUCTS will publish the complete committee memberships with an organization chart in the Annual Review Issue, to be published January 10, 1934.

The few meetings attended by the editor were well organized. Portable plant operators were out in considerable numbers, and everything seemed to be amicably adjusted.

Lime

Washington Building Lime Co., Woodville, Ohio, November 25, held a celebration in honor of its plant officers and employes who have gone 1000 days and worked 480,000 man-hours without a lost-time accident. Present were: Daniel Baker, Jr., Baltimore, Md., vice-president of the company and of the Standard Lime & Stone Co.; F. C. Thomas, general superintendent of all the company's plants; W. J. Flannigan, superintendent of the Bakerton, W. Va., plant; G. D. Hill, superintendent of the Millville, W. Va., plant; S. H. Mash, superintendent of the Havre de Grace, Md., plant; J. N. Maisel, superintendent of the Martinsburg, W. Va., plant, and F. W. Weber, superintendent of the local plant, along with all the employes of the local plant. The men were served lunch and cigars and listened to two very interesting talks by H. L. Sain and George Meehan of the State Industrial Commission of Columbus, Ohio. The visiting officials also gave short talks. The Woodville plant was the only one of the five company plants that was able to reach this high mark of 480,000 man hours of work without a lost-time accident. The five plants had all taken part in this "No Disability Injury Campaign" and at a meeting of the officials following the celebration it was decided to hold four or five meetings a year, each meeting to be at one of the different plants to further the cause of the safety of the lime workers. In a state contest of lime burners which will end on December 31, the Washington Building Lime Co. is leading. This is also a contest that is staged to further safeguard the plant workers from injuries.

Crushed Stone

Plattsburg Limestone Co., Plattsburg, N. Y., was offered for sale at public auction December 16, under federal court bankruptcy proceedings.

◈ ◈ ◈

C. W. MacQuarrie, Hartland, N. B., and **H. V. Bragdon,** Upper Woodstock, N. B., have formed a partnership to develop a limestone quarry at Waterville, York county, New Brunswick, Canada. It is expected to market the limestone to paper mills in Canada and Maine.

◈ ◈ ◈

Tennessee Valley Authority, Knoxville, Tenn., took bids December 18 for machinery and equipment for a large crushing plant to furnish aggregate for the Norris dam. The quarry will be a hillside operation, and will be stripped by hydraulic methods. Barton M. Jones is the TVA engineer in charge.

◈ ◈ ◈

Sturgeon Bay Co., Sturgeon Bay, Wis., through E. E. Holsinger, assistant general manager, announces that it has received a contract for approximately 430,000 tons of stone to be used next season in the construction of breakwaters at Indiana Harbor, Ind., and Port Washington, Wis. It is also announced that the Northwestern Co. and the Roen Steamship Co., which have their general offices and headquarters at Sturgeon Bay, Wis., have contracted to transport the major portion of the tonnage. Mr. Holsinger further states that this program, along with additional proposed federal work and enlarged state highway programs that will receive help under NRA, causes the Sturgeon Bay Co. to feel that there will be a steady operation of the quarry for some time to come. The contracts came through the Fitzsimons & Connell Dredge and Dock Co., Chicago, which was awarded the Indiana Harbor job by the government October 16, and the Great Lakes Dredge & Dock Co., which was given the Port Washington job November 1. The Roen interests were in turn contracted by the Sturgeon Bay Co. Both breakwaters will be constructed under the supervision of the United States War Department and have been planned for next season's operations as a reëmployment measure. About 350,000 tons of stone will be used at Indiana Harbor and 80,000 tons at Port Washington. A portion of the larger rip rap, not possible to get from Sturgeon Bay, will be furnished by the Northwestern Co.'s quarry located at Summer Island, Mich., which has stone stratification of exceptional thickness.

Editorial Comments

Limitation of Productive Facilities

"To provide for the general welfare by promoting the organization of industry for the purpose of coöperative action among trade groups, to induce and maintain united action of labor and management under adequate governmental sanctions and supervision, to eliminate unfair trade practices, to promote the fullest possible utilization of the present productive capacity of industries, to avoid undue restriction of production (except as may be temporarily required)." These are among the stated objectives of NIRA, which the codes of the various industries are designed to promote.

The President, in his message to Congress, urging the passage of NIRA, referred to his request to "provide for machinery necessary for a great coöperative movement throughout all industry in order to obtain"—among other things—prevention of "unfair competition and disastrous over production."

The code of fair competition for the Lime Industry was the first rock products code to come up for a formal hearing and one of the first of all industries. Malcolm Muir was the deputy (now division) administrator. The original draft of the code submitted at the hearing contained a clause which read: "In view of the excess of manufacturing capacity over demand for lime products even in normal times, and the demoralizing effect of this condition on the business and all engaged therein, including labor, it shall be an unfair method of competition for any manufacturer during the life of this code to increase the aggregate productive capacity of any lime plant (except process improvements through existing equipment), or for any person, firm or corporation to construct any additional lime plants or kilns, except for replacement of existing capacity."

When the deputy administrator came to this provision, he promptly expressed his disapproval, urging that such a provision would have the effect of staying all progress in the lime industry, and that with the other provisions of the code giving protection against price cutting, such a clause restricting new productive facilities was unnecessary; and he promised it would not be allowed.

Certainly no rock products industry could make a more defensible claim to an excess of productive capacity than the lime industry, and no rock products industry is easier to get into a small way with little capital. Persuaded by Mr. Muir's logic, or compelled by his show of authority as a federal officer, lime manufacturers dropped their attempt to control increase in productive facilities.

At the time (and ever since), these lime manufacturers were bent on expanding markets for their product, on selling service and quality; in fact for the first time in several years they felt confident of the future of lime. There is something inherently incongruous in unshaken faith in the future of one's industry, or one's product, and the necessity for a limitation on facilities to make it.

The next rock products code to come up was that for the Crushed Stone, Sand and Gravel, and Slag Industries. Apparently every possible attempt by interested parties outside the industry was made to influence the NRA to get rid of the provision against expansion of productive facilities, or render it innocuous, but the industry fought tenaciously for it, and in view of the objectives of NIRA as expressed in the law itself, it could not be thrown out.

As the provision now stands in the code as approved, the most that can be expected of it is to delay the entrance of a would-be producer into the field until his project has been thoroughly and honestly investigated. There can be no doubt of the sincerity of the NRA in watching out first of all for "the general welfare," and a well supported appeal to it over the decision of a state committee would undoubtedly receive not merely a fair but a welcome hearing. A promoter with a justifiable project has nothing to fear.

Every one, practically at least, agrees that to prosper any and every industry must have orderly development; it must be protected against the raids of promoters ignorant of the field, and of those indifferent to the opportunities, or rather lack of opportunities in many cases—in effect, the immoral promoter who hopes to profit from the promotion rather than from the operation of a new plant. The protection of "the general welfare" demands protection from both these types of promoters. It can be safely assumed that no promoter with honest intentions desires to waste or throw away his capital; so if he gets an unbiased report with all available information about the markets he proposes to serve from the state committee, he should be thankful for the service rendered, rather than otherwise.

The Cement Industry's code goes farther than any other we have seen, for it practically prohibits increase in producing capacity of the industry without a license from the President. Moreover, it provides for actual reduction of existing capacity through possible closing down or amortization of obsolete plants. We presume the justification for this is the fact that to build a cement plant requires so much money that public financing is the rule rather than otherwise, and protection of "the general welfare" requires more direct protection from the unscrupulous promoter, or from the too enthusiastic manufacturer within the ranks.

The Cement Industry's code also goes farther than any of the others "to promote the fullest possible utilization of the present productive capacity of the industry," through providing for allocation of available business. This is the most significant of all the provisions of the code because it attempts to establish by law the uniformity of cement; in other words, within the industry as governed by the code cement is cement, standard with all manufacturers, orders may be filled by one as well as by another. The effect of this on both merchandising and manufacture of cement may be far-reaching; it will certainly make for large savings in merchandising and distribution. But a lot will have to be done in the way of improvement in processing at many plants to justify, in view of the experience of many users, an assumption that all portland cement is the same.

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividend
Allentown P. C., com.[47]	12-19-33	2½	4½	
Allentown P. C., pfd.[47]	12-19-33	5	7	
Alpha P. C., com	12-16-33	13⅝	14⅝	
Alpha P. C., pfd.	12-16-33	70	....	1.75 qu. Dec. 15, '33
Amalgamated Phos. 6's, '36[47]	12-19-33	95	98	
American Aggregates, com.[47]	12-19-33	1	2	
American Aggregates, pfd.[47]	12-19-33	6	10	
American Aggregates 6's, w.w[43]	12-19-33	25	30	
American Aggregates 6's, ex. w.[47]	12-19-33	20	25	
American L. and S., 1st 7's[47]	12-19-33	50	55	
Arundel Corp., com.[47]	12-19-33	20	23	50c qu. Oct. 2, '33
Bessemer L. and C., Class A[47]	12-19-33	3	5	
Bessemer L. and C., 1st 6½s[47]	12-19-33	14	16	
Bessemer L. and C., cert. of dep.[47]	12-19-33	14	16	
Bloomington Limestone 6's[47]	12-19-33	8	10	
Boston S. and G., new com.[37]	12-11-33	1	3	
Boston S. and G., new 7% pfd.[37]	12-11-33	5	10	1.75 qu. Jan. 3, '33
Boston S. and G., 7's, 1934[37]	12-11-33	40	60	
California Art Tile, A[9]	12-11-33	1	1½	
California Art Tile, B[9]	12-11-33	....	1	
Calaveras Cement, com.	12-14-33	½	2⅛	
Calaveras Cement, 7% pfd.	12-14-33	45	75	1.75 qu. Oct. 15, '33
Canada Cement, com	12-16-33	7¼ actual sale		
Canada Cement, pfd.	12-15-33	33¼ actual sale		
Canada Cement, 5½s, 1947	11- 7-33	74	76	
Canada Crushed Stone bonds[42]	12-11-33	63	67	
Canada Crushed Stone, com.[42]	12-11-33	5 (nominal)		
Certainteed Products, com.	12-16-33	3⅝	4	
Certainteed Products, pfd.	12-16-33	15	24	
Certainteed Products, 5½s, '48	12-16-33	53⅝ actual sale		
Cleveland Quarries	11-20-33	....	24	
Consol. Cement, 1st 6½s A[41]	12-19-33	6	8	
Consolidated Cement, pfd.[47]	12-19-33	½	1	
Consolidated Oka S. and G. (Canada) 6½s[12]	10-13-33	....	20	
Consolidated Oka S. and G. (Canada), pfd.[42]	10-13-33	No market		
Consol. Rock Prod., com[47]	12-19-33	½	1	
Consol. Rock Prod., pfd.[47]	12-19-33	1	2	
Consol Rock Prod., units[47]	12-19-33	2	3	
Consol. S. and G., pfd. (Can.)[12]	10-13-33	No market		
Construction Mat., com.[47]	12-19-33	1	2	
Construction Mat., pfd.[47]	12-19-33	3	4	
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[47]	12-19-33	37	40	
Coosa P. C., 1st 6's[47]	12-19-33	10	15	
Coplay Cement Mfg., pfd.[47]	12-19-33	5	7	
Coplay Cement Mfg., 6's, '41[47]	12-19-33	35	40	
Dewey P. C., com.[47]	12-19-33	50	60	
Dolese and Shepard	12-19-33	9¼	10¼	
Dufferin Pav. & Cr. Stone, com.	12- 8-33	3	....	
Dufferin Pav. & Cr. Stone, pfd.	12- 8-33	16	....	
Edison P. C., com.[47]	12-19-33	1	3	
Edison P. C., pfd.[47]	12-19-33	4	6	
Federal P. C. 6½'s, 1941[47]	12-19-33	28	32	
Giant P. C., com.[47]	12-19-33	2	4	
Giant P. C., pfd.[47]	12-19-33	6	10	
Gyp. Lime & Alabastine, Ltd.	12-15-33	4	....	
Gyp. Lime & Alabastine 5½'s, 1948	12-12-33	49	52	
Hermitage Cement, com.[47]	12-19-33	10	15	
Hermitage Cement, pfd.[47]	12-19-33	35	40	
Ideal Cement 5's, 1943[47]	12-19-33	95	97	
Ideal Cement, com.	12-11-33	24½	26	25c qu. Oct. 1, '33
Indiana Limestone 6's[47]	12-19-33	15	20	
International Cement bonds, 5's	12-15-33	80	....	Semi-ann. int.
International Cement, com.	12-16-33	30¼	31	
Kelley Island L. and T.	12-19-33	8	9⅞	25c qu. Jan. 2, '33
Ky. Cons. Stone, 6½'s, 1933	11-18-33	5	6	
Ky. Cons. Stone, com.[47]	12-19-33	....	1	
Ky. Cons. Stone, pfd.	12-19-33	....	5	
Ky. Cons. Stone, 7% pfd.[47]	12-19-33	....	5	
Ky. Cons. Stone, 1st Mtg. 6½'s[46]	12-20-33	8	....	
Ky. Cons. St. V. T. C.[47]	12-19-33	....	1	
Ky. Rock Asphalt, com.	11-18-33	....	2	
Ky. Rock Asphalt, pfd.	11-18-33	10	....	
Ky. Rock Asphalt 6½'s, 1935	11-18-33	55	62½	
Kentucky Stone, com.	8-19-33	....	¼	
Kentucky Stone, pfd.	8-19-33	....	10	
Lawrence P. C.	12-16-33	11	15	
Lawrence P. C. 5½'s, 1942[47]	12-19-33	47	50	
Lehigh P. C., com.	12-19-33	12¼	14	
Lehigh P. C., pfd.	12-19-33	73	77	87½c qu. Jan. 2, '34
Louisville Cement[47]	12-19-33	65	75	
Lyman-Richey 1st 6's, 1935[47]	12-19-33	80	90	
Marbelite Corp., com. (cement products)[9]	12-11-33	5c	½	
Marbelite Corp., pfd.[9]	12-11-33	¼	¾	
Marquette Cement, com.[47]	12-19-33	7	9	
Marquette Cement, pfd.[47]	12-19-33	50	53	1.50 qu. Jan. 3, '33
Marquette Cem. Mfg. 1st 5's, 1936[47]	12-19-33	65	75	
Marquette Cem. Mfg. 1st 6's, 1935[46]	12-20-33	60	65	
Material Service Corp.[47]	12-19-33	4	6	
McCrady-Rodgers, com.[47]	12-19-33	6	9	
McCrady-Rodgers, 7% pfd.[47]	12-19-33	30	40	
Medusa P. C., com.	12- 1-33	9 actual sale		
Medusa P. C., pfd.[47]	12-19-33	30	35	
Michigan L. and C., com.[47]	12-19-33	45	50	
Missouri P. C.	12-19-33	8	....	
Monarch Cement, com[47]	12-19-33	40	50	
Monolith P. C., com.	12-14-33	1	2	
Monolith P. C., pfd.	12-14-33	3½	5	25c qu. Sept. 28, '33
Monolith P. C. units[47]	12-19-33	6	8	
Monolith P. C. 1st Mtg. 6's[47]	12-19-33	75	80	
Monolith Portland, Midwest[47]	12-19-33	½	1	
National Cem. (Can.), 1st 7's	10-13-33	No market		
National Gypsum A, com.	12-19-33	5¾	6¼	
National Gypsum, pfd.	12-19-33	68	70	1.75 qu. Oct. 1, '33
National Gypsum 6's[47]	12-19-33	80	83	
National L. & S., 6½'s, 1941[47]	12-19-33	60	70	
Nazareth Cement, com.[47]	12-19-33	2	4	
Nazareth Cement, pfd.[47]	12-19-33	25	30	
Newaygo P. C. 1st 6½'s[47]	12-19-33	37	40	
New England Lime 6's, 1935[14]	12-10-33	8	10	
N. Y. Trap Rock 1st 6's, 1946	12-16-33	50⅜ actual sale		
N. Y. Trap Rock, 7% pfd.[47]	12-19-33	60	65	1.75 qu. Jan. 3, '33
North Amer. Cement 1st 6½'s[47]	12-19-33	15	20	
North Amer. Cement, com.[47]	12-19-33	1	2	
North Amer. Cement, 7% pfd.[47]	12-19-33	2	4	
North Shore Mat. 1st 6's[47]	12-19-33	35	40	
Northwestern States P. C.[47]	12-19-33	35	37	
Northwestern Port. Cem. units	12-19-33	28	32	
Ohio River S. and G., com.	12-19-33	1	2	
Ohio River S. and G., 1st pfd.[41]	12-19-33	5	8	
Ohio River S. and G., 2nd pfd.[47]	12-19-33	2	4	
Ohio River S. and G., 6's[47]	12-19-33	8	12	
Oregon P. C., com.[47]	12-19-33	10	13	
Oregon P. C., pfd.[47]	12-19-33	60	65	
Pacific Coast Aggr., com.[40]	12-11-33	....	10c	
Pacific Coast Aggr., pfd.[40]	12-11-33	15c	30c	
Pacific Coast Aggr., 6½'s, '44	10-13-33	15	17	
Pacific Coast Aggr., 7's, 1939	10-13-33	1	3	
Pacific Coast Cement 6's, 1937[47]	12-19-33	40	44	
Pacific P. C., com.[40]	12-11-33	5	6	
Pacific P. C., pfd.[40]	12-11-33	30	33	
Pacific P. C. 6's, 1935[47]	12-19-33	90	92	
Pacific P. C. 6½'s, pfd.	10-15-33	32½	....	1.62½ qu. Jan. 5, '33
Peerless Cement, com.[47]	12-19-33	¼	¾	
Peerless Cement, pfd.[47]	12-19-33	1	2	
Penn.-Dixie Cement, com.	12-16-33	4¼	4⅞	
Penn.-Dixie Cement, pfd.	12-16-33	13⅛	15⅝	
Penn.-Dixie Cement 6's A	12-16-33	66 actual sale		
Penn. Glass Sand Corp., pfd.[47]	12-19-33	65	70	1.75 qu. Oct. 2, '33
Penn. Glass Sand Corp., 6's[47]	12-19-33	92	95	
Petoskey P. C., com.	12-19-33	¾	1¼	
Petoskey P. C. 6's, 1941	11-21-33	39	44	
Petoskey P. C. 6's, 1935	12-19-33	39	43	
Phosphate Mining Co. (N. Y.), com.	12-19-33	No market		
Port Stockton Cem., com.[9]	12-11-33	No market		
Republic P. C. 6's, 1943	11-21-33	63	68	
Riverside Cement, A[47]	12-19-33	3	5	
Riverside Cement, B[47]	12-19-33	1	2	
Riverside Cement, pfd.	12-19-33	65	70	1.50 qu. Nov. 1, '33
Rockland and Rockport Lime, 1st pfd.	12-19-33	1	2	
Sandusky Cement 6's[47]	12-19-33	30	35	
Sandusky Cement 6½'s, 1932-1937[47]	12-19-33	35	40	
Santa Cruz P. C., com.[47]	12-19-33	50	55	1.00 qu. Jan. 2, '34
Schumacher Wallboard, com.[47]	12-19-33	1	2	
Schumacher Wallboard, pfd.[47]	12-19-33	3	5	
Signal Mt. P. C., units[47]	12-19-33	10	15	
Southwestern P. C., units[47]	12-19-33	160	175	
Southwestern P. C., com.[47]	12-19-33	25	30	1.00 qu. Oct. 2, '33
Southwestern P. C., pfd.[47]	12-19-33	75	90	2.00 qu. Oct. 2, '33
Standard Paving & Mat. (Canada), com.	12-15-33	2¼ actual sale		
Standard Paving & Mat., pfd.	12- 1-33	16 actual sale		
Superior P. C., A[47]	12-19-33	20	25	27½c mo. Dec. 1, '33
Superior P. C., B[47]	12-19-33	4	7	27½c mo. Dec. 1, '33
Trinity P. C., units[47]	12-19-33	25	30	
Trinity P. C., com.[47]	12-19-33	5	10	
Trinity P. C., pfd.[47]	12-19-33	20	25	
U. S. Gypsum, com.	12-19-33	44	45¼	25c qu. Jan. 2, '34
U. S. Gypsum, pfd.	12-16-33	110⅜	116	1.75 qu. Jan. 2, '34
Wabash P. C.[47]	12-19-33	5	6	
Warner Co., com[47]	12-19-33	3	5	
Warner Co., 1st 7% pfd.[47]	12-19-33	15	20	
Warner Co. 6's, 1944 w.w.	12-19-33	30	40	
Warner Co., 6's, 1944, ex.w.	12-19-33	20	25	
Whitehall Cem. Mfg., com.[47]	12-19-33	15	20	
Whitehall Cem. Mfg., pfd.[47]	12-19-33	30	35	
Wisconsin L. & C., 1st 6's, '33[47]	12-19-33	70	90	
Wisconsin L. & C. 6½'s[47]	12-19-33	70	90	
Wolverine P. C., com.[47]	12-19-33	1	2	
Yosemite P. C., A com.[47]	12-19-33	2	4	

Quotations by: [9]A. E. White Co., San Francisco, Calif. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [14]First Wisconsin Co., Milwaukee, W's. [37]Wise Hobbs & Arnold, Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thompson & Co., Toronto. [46]First Union Trust & Savings Bank, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill.

Warner Co., Philadelphia, Penn.: Block of 30 shares, preferred, and 30 shares common stock, sold recently at auction in Philadelphia for $250 the lot.

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International Cement Corp., New York City, reports consolidated earnings for the three months ended September 30:

	1933	1932
Gross sales	$3,725,755	$4,166,368
Expenses, etc.	2,617,404	3,344,935
Depreciation	757,603	955,087
Operating profit	350,748	(d)133,654
Interest, taxes, contingency, etc.	320,512	385,770
Net profit	30,236	(d)519,424
9 months to September 30:		
Gross sales	$9,669,314	$11,274,825
Expenses, etc.	6,806,382	9,425,679
Depreciation	2,025,705	2,113,293
Operating profit	837,227	(d)264,147
Interest, taxes, contingency, etc.	1,060,148	1,014,518
Net profit:		
March quarter	(d)180,858	(d)409,713
June quarter	(d)72,300	(d)349,528
September quarter	30,236	(d)519,424
9 months	(d)$222,921	(d)$1,278,665

Note: Net results from operations of South American subsidiaries are taken in at average exchange rates prevailing during these periods.

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Federal Portland Cement Co., Buffalo, N. Y.: Following committee has been formed to represent holders of company's first mortgage 6½% bonds due 1941: F. C. Trubee, Jr., C. A. Criqui and A. W. Sawyer. Counsel: Brown, Ely & Richards, Buffalo, N. Y. Secretary: Walter P. Hooper, 602 M. & T. Trust Bldg., Buffalo. Depositary: Manufacturers & Traders Trust Co., Buffalo.

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Consolidatd Oka Sand & Gravel Co., Ltd., Toronto, Ont., reports earnings for the calendar years:

	1932	1931
Operating profit for year	$22,505	$127,201
Bond interest	43,615	44,403
Depreciation	.....	43,487
Organization expenses written off	.....	2,878
Sinking fund	.....	.....
Reserve for bad debts	.....	.....
Special depreciation on barges	.....	.....
Reserve for discounts and claims	.....	.....
Net profit	loss$21,109	$36,433
Previous surplus	37,428	63,992
Prior year adjustments	15,302	Dr4,761
Total surplus	$1,016	$95,663
Dividend on preferred stock	.....	49,119
Balance, surplus	$1,016	$46,544
Earnings per share on 21,000 shares common stock ($5 par)	Nil	Nil

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Northwestern States Portland Cement Co., Mason City, Ia., paid its first common stock dividend since April 1, 1931, on October 2, 1933. The amount of the dividend was 1% on $100 par value. In announcing the dividend, Hanford MacNider, president, said:

"Your directors, in declaring this dividend, felt that while normally in times of business uncertainty, all assets should be rigidly conserved, the unusually strong financial position of the company justified this small disbursement, which we hope will be appreciated by the stockholders.

"Our shipments this year have approximated only half of 1932, which in turn represented a 33⅓% decline from 1931. It has been a constant struggle to hold down the mounting manufacturing costs incident to reduced production, and at the same time a running battle to obtain our share of what little business was available."

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Standard Paving and Materials (and subsidiaries), Montreal, Que., reports for the years ended March 31 consolidated earnings:

	1933	1932
Net profit from operations	loss$41,633	$274,351
Miscellaneous income	34,593	50,705
Net earnings	loss$7,040	$325,056
Depreciation	131,156	150,000
Reserve for income tax	.....	13,500
Other reserves	4,000	7,500
Investments written down	.....	.....
Net profit	def$142,196	$154,055
Preferred dividend	27,360	99,925
Preferred dividend (C. S. & G.)	21,464	75,754
Common dividends	.....	52,429
Surplus for year	def$191,021	def$74,052
Previous surplus	1,024,076	1,125,628
Contingency reserve	.....	.....
Capital surplus	.....	.....
Credit adjustment of reserves for Federal income taxes	2,720	.....
Total	$835,776	$1,051,576
Organization expense	.....	.....
Adjustment of reserves for Federal income taxes	.....	27,500
Balance carried forward	$835,776	$1,024,076

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Recent Dividends Announced

Alpha Portland Cement, 7% pfd. (qu.)	$1.75	Dec. 15, 1933
Lehigh Portland Cement, pfd. (qu.)	$ .87½	Jan. 2, 1934
Santa Cruz Portland Cement (qu.)	$1.00	Jan. 1, 1934

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Miscellaneous

Foundry Sand: The Bureau of Standards, Department of Commerce, is conducting tests on domestic sands in an effort to determine if a sand can be found to replace that now being imported for use in foundries producing fine precious metal and bronze ornamental work, it was announced December 13. The imported sand has a peculiar combination of grain and bond which gives it high permeability and refractoriness and the current tests are being conducted to ascertain if domestic sand is available which possesses the same desirable qualities.

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Mathieson Alkali Works, Inc., New York City, will erect a $7,000,000 caustic soda and soda ash plant at Lake Charles, La. Lime will be made from oyster shells.

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Fiske Brick and Granule Co., Milton, Penn., recently shipped 11 tons of slate roofing granules to Alexandria, Egypt.

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Columbia Mining Product Co., Walla Walla, Wash., has been capitalized for $100,000 to develop a deposit of very finely divided silica to be sold as a cleaner "13." The "13" cleaner is said to be half soap and half silica. James O. Howton is general manager of the company.

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"Cornwall Stone" is said to have been discovered in a broad belt between Spruce Pines and Asheville, N. C. Cornwall stone heretofore has come entirely from England. It is a residual product resulting from the decomposition of feldspar and is extensively used in the ceramic industry. American imports from England have ranged between 6000 and 7500 tons per year. Tennessee Mineral Products Co., Spruce Pine, is said to be contemplating development of the deposit.

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Rapidan Soapstone Co., near Somerset, Va., has leased its property to Richmond, Va., parties and plans are to reopen the quarry after several years' shutdown.

Mineral Resources of Tennessee River Basin

THE United States Geological Survey, Department of the Interior, has recently published a map of the Tennessee River Basin and some adjacent areas, showing the character and distribution of the better-known mineral resources that are available for development or exploitation under the Tennessee Valley Authority. The map, which is printed in five colors, is on the scale of 1:500,000, or about 8 miles to the inch, and includes the greater part of Tennessee and Kentucky, together with adjacent portions of Virginia, West Virginia, North and South Carolina, Georgia, Alabama, Mississippi and Missouri.

Resources Grouped

The map brings together for the first time much information hitherto scattered in Federal and State reports and in other published articles. The resources whose distribution is mapped are grouped under six general headings—coal, oil and gas, iron, nonferrous metals, structural materials, and nonmetallic minerals. Forty-seven different designs are employed to represent the various products. The base map shows, besides the ordinary geographic features, such as drainage, towns, and county boundaries, the outline of the Tennessee River Basin and the sites of the Wilson Dam and the Norris Dam, as well as other developed water power in the same area.

The map is intended to serve as a basis for detailed studies which must be made to bring general information up to date and to provide the precise data needed for any actual exploitation. It should prove of great value to anyone who contemplates utilizing any of these resources in connection with the power that will be generated along the Tennessee River and its tributaries. A copy of the map may be had for $1 from the Director, U. S. Geological Survey, Washington, D. C.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of December 16:

31583. **Stone,** broken or crushed, C. L., in bulk, in gondola or other open cars, (See Note 3) from Westfield (Hampden Quarry), Mass., to New Canaan, Conn. Present—$1.35 N. T. Proposed—$1.15 N. T. Reason—Establishment of rate from Westfield (Hampden Quarry), Mass., comparable with rate currently effective from Branford (Pine Orchard Quarry), Conn.

31619. **Sand,** building, common or run of bank, C. L., (See Note 2) except when the combined weight of car and lading exceeds published maximum weight limits, in which case the minimum weight will be the maximum weight that can be transported via the direct route to destination point without exceeding the maximum weight limit, from stations named in N. Y. N. H. & H. R. R. I. C. C. F2795, page 394 (as amended), to N. Y. N. H. & H. R. R. stations and its lateral lines named in said tariff.

PRESENT

Mileage Scale

1 mile to 30 miles	3½c per 100 lb.
31 miles to 60 miles	4½c per 100 lb.
61 miles to 90 miles	5c per 100 lb.
91 miles to 120 miles	6c per 100 lb.
121 miles to 150 miles	7c per 100 lb.
151 miles to 180 miles	7½c per 100 lb.
181 miles to 200 miles	8c per 100 lb.
201 miles to 360 miles	9c per 100 lb.

PROPOSED

Mileage Scale

1 mile to 30 miles	3½c per 100 lb.
31 miles to 60 miles	4½c per 100 lb.
61 miles to 75 miles	5c per 100 lb.

Reason—Investigation indicates that there is no movement of common building sand for distances greater than 75 miles, therefore it is proposed to cancel these obsolete commodity rates.

Trunk Line

31763. **Crushed stone, C. L., broken stone,** C. L. (See Note 2), from Munns, N. Y., to Canastota, Wampsville and Oneida Castle, N. Y., $1, and Vernon and Hecla, N. Y., $1.10 per net ton.

31312. To establish rates on **limestone, agricultural, dust, ground, precipitated or pulverized,** C. L., minimum weight 50,000 lb., from D. & H. Co. stations in the Albany, Schenectady, Voorheesville, Troy, etc., sand shipping district to N. Y. C. R. R. and W. S. R. R. stations, no higher than proposed from Jordanville, N. Y., as shown in Rate Proposal 31312.

31773. Cancel rates on commodities shown below: (A) **Sand, common or building** (not blast, engine, fire, foundry, glass, moulding or silica sand), and **gravel,** C. L.; (B) **stone, natural** (other than bituminous asphalt rock), **crushed,** C. L.; (C) **sand, blast, engine, fire, foundry, glass, moulding or silica,** C. L., from (1) Ballina, N. Y., (2) Jordan, N. Y., (3) Woodard, N. Y.

To N. Y. O. & W. Ry. from (1); commodity (A); Items 4455 to 4480, inc.; I. C. C. N. Y. C. Tariff 16473.

To D. L. & W. R. R. from (1); commodity (A); Items 6255 to 6300, inc.; I. C. C. N. Y. C. Tariff 16528.

To L. V. R. R. from (1); commodity (A); Items 9890 to 9945, inc.; I. C. C. N. Y. C. Tariff 16501.

To N. Y. C. R. R. from (1); commodity (A); Items 2790 to 2840, inc., and 2800-A, Sup. 37; I. C. C. N. Y. C. Tariff 15844.

To N. Y. C. R. R. from (1); commodity (B); Items 3100 to 3145, inc.; I. C. C. N. Y. C. Tariff 16422.

To D. L. & W. R. R. from (2); commodity (C); Items 6530 and 6535; I. C. C. N. Y. C. Tariff 16528.

To L. V. R. R. from (2); commodity (C); Items 9690 and 9695; I. C. C. N. Y. C. Tariff 16501.

To N. Y. C. R. R. from (2); commodity (C); Items 2050 to 2155, inc.; I. C. C. N. Y. C. Tariff 15739.

To N. Y. C. R. R. from (3); commodity (C); Items 1045 to 1155, inc., and 1045-A to 1070-A, Sup. 17; I. C. C. N. Y. C. Tariff 15730.

Reason: Investigation develops no traffic has moved for some time nor is there prospects for future shipments; rates obsolete.

31653. **Broken stone,** C. L., (See Note 2), from St. Peters, Pa., to Cold Spring Harbor and Wildwood Crest, N. J., 205c, and Sea Isle City and Strathmere, N. J., 195c per net ton.

31654. **Building sand,** C. L., (See Note 2), from Hancock, Berkeley Springs and Great Cacapon, W. Va., to Harrisonburg, Va., rate $1.50 per net ton.

Sup. 1 to 31592. **Sand,** in open top cars, C. L.: From Buffalo, Ia., to Whitton, Ill.: present, $151; proposed, $1.13. From Linwood, Ia., to Proving Ground, Ill.: present, $1.51; proposed, $1.13. (See Note 2), from Hancock-Berkeley Springs district to Butler, Penn., rate $1.70 per net ton.

Sup. 3 to 31485. **Phosphate rock, crude, lump, ground; superphosphate** (acidulated phosphate rock), in bulk, in straight or mixed carloads, minimum weight 40,000 lb., from New York, N. Y., to Benton, Pa., 16c per 100 lb.

31671. **Limestone, ground,** C. L., minimum weight 50,000 lb., from Annville, Cedar Hollow, Cold Point, Hummelstown, Mill Lane, Myerstown, Palmyra, Plymouth Meeting, Shainline, Swatara and Williams, Pa., to Quantico, Va., 14c per 100 lb.

31680. **Crushed stone and screenings,** C. L., (See Note 2), to Lakehurst, N. J., from Morrisville, Pa., $1.10 and from Lambertville, N. J., $1.20 per net ton.

5319-H. **Sand, gravel, stone, etc.,** C. L., as described in item 50-A of W. T. L. Tariff 175, applicable only on intrastate traffic, (See Note 3), but in no case shall the minimum carload weight be less than 40,000 lb., from Louisville, Nehawka and Weeping Water, Neb., to Norfolk, Neb. Rates: Present—Rates via Un. Pac. R. R. are one-half cent higher than proposed rates. Proposed—8c per 100 lb., from Louisville, Neb., 9c per 100 lb., from Nehawka, Neb., 8½c per 100 lb., from Weeping Water, Neb

31700. **Limestone, unburned, ground,** C. L., minimum weight 50,000 lb., from Natural Bridge, N. Y., to Minetto, N. Y., 9c per 100 lb.

31702. **Limestone, ground, precipitated or pulverized, and limestone dust,** in carloads, minimum weight 60,000 lb., from Lime Crest, N. J., to Van Etten, Spencer, North Spencer, West Danby, Newfield and Ithaca, N. Y., 10½c per 100 lb.

839. (Bulletin.) To revise the rates on **crushed stone, gravel pebbles, other than grinding, common sand and crushed slag;** also **coated crushed stone and slag,** within Trunk Line territory and from Trunk Line territory to C. F. A. territory as proposed in exhibit appended hereto. Public hearing will be held before the General Freight Committee, Trunk Line Association, room 401, 143 Liberty Street, New York, N. Y., on Tuesday, January 9, 1934, at 10:15 a. m., eastern standard time. Interested parties will be heard at time and place specified.

Proposed, that all rates on coarse concrete aggregates, i.e., crushed stone, gravel, pebbles (other than grinding), common sand and crushed slag, and also all rates on coated crushed stone and slag, from all origins in Trunk Line territory to all destinations in Trunk Line and Central Freight Association territories, except between points on C. & O. Ry. on commodities specified in paragraph 1 and all Virginia intrastate traffic, be revised to the following bases:

1—UNCOATED MATERIALS

List of Commodities

Gravel, in bulk, in open top equipment, in straight carloads, or in mixed carloads with sand as described below in bulk; sand, common, viz., all sand other than industrial sand, in bulk, in open top equipment without protective covering, in straight carloads, or in mixed carloads with gravel in bulk; screenings, crushed stone, in bulk in open top equipment in straight carloads; slag (product of iron or steel blast or open hearth furnaces), not ground or pulverized, in bulk in open top equipment, in straight carloads; stone, crushed, in bulk, in straight carloads.

Scales

(A) On basis of Lycoming scale of rates prescribed in P. S. C. Pa. Dockets 7530 and 7553, except on slag from Bethlehem and Hokendauqua, Pa., the Buckland scale prescribed in I. C. C. Docket 15216 will be the basis, and except as provided in (B) below.

(B) On basis of Davison (West Penn) scale of rates prescribed in I. C. C. Docket 15329 and P. S. C. Pa. Docket 6951 (See Note):

(1) On crushed stone, crushed stone screenings and slag from and to points in T. L. territory in the states of West Virginia (west of a line traversing the western boundary of Maryland and the eastern boundaries of Tucker, Randolph and Pocahontas counties to the Va.-W. Va. state line), Maryland (Cumberland and west) and Pennsylvania (on and west of a north and south line through Cresson), and from these points to points in C. F. A. territory.

(2) On sand and gravel from points in (1) above to points in C. F. A. territory and points in T. L. territory in the states of West Virginia and Maryland as outlined in (1) above and Pennsylvania on and west of a line beginning at Bullis Mill, thence through Port Allegany, Coudersport, Germania, Jersey Mills, Williamsport, Allens, Glen Iron, Raube Mills, Duward and Port Royal to the Penn.-Md. state line.

(3) On sand, gravel, crushed stone, screenings and slag from points in New York State on and west of a line beginning at Rochester, N. Y., thence via the P. R. R. to Portage, thence via the Erie R. R. to Friendship, thence via the P. S. & N. to the N. Y.-Penna. state line, to points in C. F. A. territory and points in T. L. territory as outlined in (1) above, except that rates under (A) above to T. L. western termini and border points east and north of the boundaries of (1) above will be held as minima.

Note—This scale will not apply from or to any points on the N. & W. Ry. or Virginian Ry.

2—COATED MATERIALS

List of Commodities

Gravel, coated with tar, oil, asphaltum or similar bituminous materials, in bulk in open top equipment in straight carloads. See Note. Slag (product of iron or steel blast or open hearth furnaces), not ground or pulverized, coated with tar, oil and/or asphaltum or similar bituminous material in bulk in open top equipment in straight carloads. See Note. Stone, crushed, coated with tar, oil, asphaltum or similar bituminous materials, in bulk in open top equipment in straight carloads. See Note.

Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading (See Note 3).

Scales

(A) On basis of Tyrone Forge scale prescribed in I. C. C. Docket 25028 and P. S. C. Pa. Dockets 9114 and 9146, except as provided in (B) below.

(B) On basis of Shaw Jct. scale prescribed in I. C. C. Docket 22598 (see Note):

(1) From and to points in T. L. territory in the states of West Virginia (west of a line traversing the western boundary of Maryland and the eastern boundaries of Tucker, Randolph and Pocahontas counties to the Va.-W. Va. state line), Maryland (Cumberland and west) and Pennsylvania (on and west of a north and south line through Cresson), and from these points to points in C. F. A. territory.

(2) From points in New York State on and west of a line beginning at Rochester, thence via the P. R. R. to Portage, thence via the Erie R. R. to Friendship, thence via the P. S. & N. to the N. Y.-Penna. State line, to points in C. F. A. territory and points in T. L. territory as outlined in (1) above, except that rates under (A) above to T. L. western termini and border points east and north of the boundaries of (1) above will be held as minima.

Note—This scale will not apply from or to any point on the N. & W. Ry. or Virginian Ry.

3—GENERAL APPLICATION

The above scales (single line for distances via one line and joint for distances via more than one line) will be applied for the distances from each individual origin (see Exception) under the mileage formula set forth in the Commissions' orders named above, and the lowest resulting rate will be the published rate via all routes except that no unauthorized violations of the long and short haul provisions of the laws of the various states and the Interstate Commerce Act will be published. Where unauthorized violations are created via any route the rates creating the violation will not be published via those routes until relief is secured

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

or the rates will be increased to clear the higher rated intermediate point rate.

Exception—The grouping of Martinsburg, W. Va., Engle, W. Va., and Security, Md., and in the Mapleton district and South Jersey groups, will be continued as at present and rates will be determined on basis of the average distances from those groups to each destination.

Present commodity descriptions will be revised to the above descriptions and rates to points beyond the mileage limits of the above scales will be canceled. Rates from each origin will be confined to the commodities shipped therefrom.

31719. **Ground limestone,** C. L., min. wt. 50,000 lb., from Union Stone Co., Billmyer, Bainbridge, Rheems, York Stas. and Campbell to Wrightsville, Pa., to Garfield to Ridgewood Jct., N. J., 14c per 100 lb.

31723. **Crushed stone, coated with oil, tar and asphaltum,** C. L., (See Note 2) from Reading, Pa., to Wilkes-Barre, Pa., $1.53 and Scranton, Pa., $1.63 per net ton.

31726. **Ground sand,** C. L., (See Note 2) from Newport, N. J., to Albany, N. Y., $3 per net ton.

Central

38137. To establish on **agricultural limestone,** in box cars, C. L., minimum weight 50,000 lb., from Genoa, Martin, Marblehead and Danbury, O., to Little Valley, Sheridan, Blasdell, Dayton, Conewango, Salamanca and Red House, N. Y., rate of 202c per N. T. (Erie Ry. delivery.)

38140. To establish on **crushed stone,** in open top cars, from Piqua, O., to New Carlisle, O., rate of 70c per N. T. Route—Via B. & O. R. R., Troy, O., C. C. C. & St. L. Ry.

38147. To establish on **crushed stone and agricultural limestone,** in open top cars, C. L.

From	Proposed	*Present
Carey, O., to Limaville, O.	125c N. T.	18c
Carey, O., to Summitville, O.	135c N. T.	18c
McVittys, O., to Limaville, O.	135c N. T.	18c
McVittys, O., to Summitville, O.	135c N. T.	19c

*Sixth class.

Route—Via Foresto, O., and P. R. R.

38148. To establish on **crushed stone and agricultural limestone,** in open top cars, C. L., to Augusta, O., from Carey and McVittys, O., rate of 135c per N. T. Route—Via Clyde, O., and N. Y. C. R. R.

38149. To establish on **sand, burnt or refuse,** C. L., from Pittsburgh, Pa., to Groveton, Pa., rate of 90c in open top cars and 104c per N. T. in box cars. Route—Via P. R. R., Homestead, Pa., and P. & L. E. R. R. Present—9c (sixth class).

38156. To establish on **crushed stone and crushed stone screenings,** C. L., from Narlo, O., to Kokomo, Ind., rate of 135c per N. T.

38157. To establish on **crushed stone and agricultural limestone,** in open top cars, C. L., from Narlo, O., to Alvordton, O., rate of 105c per N. T. Route—Via N. Y. C. & St. L. R. R., Latty, O., and C. N. R. R.

38158. To establish on **stone, crushed, stone screenings, limestone, agricultural,** unburned, in bulk in open top cars, in straight or mixed carloads, from Middlepoint, O., to Huntington, Ind., rate of 95c per N. T. Route—Via P. R. R., Ft. Wayne, Ind., Wab. Ry.

37873. To establish on **sand,** other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica, and **gravel,** in open top cars, C. L., from Painesville, O., to Chardon, O., rate of 40c per N. T.

37874. To establish on **stone, crushed,** and **crushed stone screenings,** in open top cars, C. L., from Painesville, O., to Chardon, O., rate of 40c per N. T.

37875. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica), and **gravel,** C. L., from Hamilton, O., to Springfield, O., rate of 90c per N. T., via P. R. R. direct.

38075. To establish on **agricultural limestone** (ground or pulverized), **agricultural limestone meal and agricultural limestone screenings,** in box cars, C. L. (See Note 3), to Cincinnati, O., from Carey and McVittys, O., rate of 160c per N. T.

38095. To establish on **crushed stone and agricultural limestone,** in open top cars, C. L., to Piedmont, O., from Carey and McVittys, O., rate of 135c per N. T.

38096. To establish on **crushed stone and agricultural limestone,** in open top cars, C. L., to West Alliance, O., from Carey and McVittys, O., rate of 125c.

37996. To establish on **phosphate rock,** crude or phosphate rock, crude, ground, or limestone, phosphatic, in bulk in bags, C. L., minimum weight as per Item 42 of L. & N. R. R., G. F. O. 44-D, except that the minimum weight on phosphate rock, crude, ground, is 40,000 lb., in connection with rates to Chicago and Chicago Heights, Ill., N. C. & St. L. R. R. in the Mt. Peasant-Centreville district, as per L. & N. R. R. Tariff mentioned above, rate of 369c per net ton. Proposed route: Via C. I. & L. Ry., thence G. T. and M. C. Railroads and carriers east thereof. Present, 481c per net ton. Present route, via Louisville, Ky., Cincinnati, O., and C. I. & L. and Grand Trunk Rys. or M. C. R. R.

Illinois

7588. **Crushed stone,** C. L., (See Note 3), but not less than 40,000 lb. Rates per net ton.

7597. **Sand and gravel,** C. L., from Decatur, Ill., to Springfield, Ill. Present, 63c per net ton for local delivery on I. T. R. R. Proposed, 70c per net ton for deliveries on connecting lines at Springfield.

7599. **Sand and gravel,** C. L., from Ottawa, Ill., to I. C. R. R. points in Illinois, viz., Champaign, Seymour, Deland, Weldon, Lanes, Lostant, Panola, Kappa, Randolph, El Paso, etc. Present—Various. Proposed—Same rates as from Utica, Ill.

Southern

3585. **Stone,** viz., limestone or marble, ground or pulverized to fineness to pass through a screen of 200 mesh to the inch, C. L., Cartersville. Tate and Whitestone, Ga., to Zanesville, Ohio. Present rate, combination. Proposed rate on stone, viz., limestone or marble, ground or pulverized to fineness to pass through a screen of 200 mesh to the inch, in bulk, or in bulk in bags or barrels, C. L., minimum weight 60,000 lb., from and to above named points, 439c per net ton—same as currently in effect to Crooksville, Ohio.

3398. **Limestone,** ground or pulverized, C. L., Dugan, Ky., to Akron, O. Present rate, 530c (combination). Proposed rate on limestone, ground or pulverized, C. L., minimum weight 60,000 lb., from Dugan, Ky., to Akron, O., 320c per net ton.

3435. **Limestone,** ground, C. L., Rocky Point, Indian Rock, Eagle Mountain and Falling Spring, Va., to Dunn, N. C. It is proposed to establish reduced rates on limestone, ground, C. L., minimum weight 60,000 lb., to Dunn, N. C., from Rocky Point, Va., 170; Eagle Mountain, Va., 180; Indian Rock, Va., 170; Falling Spring, Va., 190c per net ton.

Western

Sup. 1 to 5319-H. **Sand, gravel, stone,** etc., C. L., as described in Item 50-A of W. T. L. Tariff No. 175, applicable only on intrastate traffic, from Louisville, Nehawka and Weeping Water, Neb., to Norfolk, Neb. This subject has now been cancelled from the docket.

Southwestern

2480. **Granite, crushed, or crushed stone,** from Iron Mountain, Lopez, Middlebrook and Pilot Knob, Mo., to Chicago, Ill. To amend Item 2500-A, S. W. L. Tariff 68-N, by establishing the following additional routes in connection with rate of 14½c:

Mo. Pac., Bismarck, Mo., M.-I. R. R., Centralia, Ill., C. B. & Q. or I. C.

Mo. Pac., Bismarck, Mo., M.-I. R. R., Salem, Ill., C. & E. I.

Mo. Pac., East St. Louis, Ill., C. & E. I., C. B. & Q. or I. C.

A-1230. **Phosphate rock, ground or pulverized,** from, to and between stations in southwestern and Kansas-Missouri territories. To amend Section 3, Item 570-B, S. W. L. Tariff 173-E, so as to permit the Class 16, minimum weight 40,000 lb. on phosphate rock, ground or pulverized, not acidulated or ammoniated, C. L., to alternate with Class 12 ratings, minimum weight 80,000 lb. as shown in Section 6.

Proposed I. C. C. Decision

21267. Cement. Signal Mountain Portland Cement Co. vs. A. G. S., et al. By Examiner T. L. Haden. Rates from Chattanooga, Tenn., to destinations in Florida prior to August 20, 1926, applicable. Proposed that the commission further find that the rates charged on and after that date were inapplicable; that the shipments were overcharged, and that combinations of separately established rates to and from the certain points treated by the so-called combination rule, were applicable; to destinations on the A. C. L., combinations based on Eastport, Fla., from August 20, 1926, to April 14, 1928, or on Milldale, Fla., from June 30, 1927, to April 14, 1928; to destinations on the S. A. L., combinations based on Fernandina, Fla., from August 20, 1926, to March 21, 1927, and from October 25, 1927, to April 14, 1928.

I. C. C. Decisions

25697. Sand. By division 4. Sunderland Bros. Co. vs. Chicago, Milwaukee, St. Paul and Pacific Railroad Co., et al. Rate charged on sand in carloads from Clayton, Iowa, to Omaha, Neb., found applicable and not unreasonable. Shipments found not misrouted. Complaint dismissed.

25715. Sand and Gravel. By division 4. Louisiana Highway Commission vs. L. and A., et al. Dismissed complaint alleging that mileage between Antoine, Ark., and Atkins, La., should be computed at 158.1 miles instead of the carriers' calculation of 161.8.

25887. Sand. By the commission. Welch-Sandler Sand Co. vs. A. T. and S. F., et al. Sand rate from Frisbie, Kan., to Missouri points found not unduly prejudicial. Case dismissed.

Sand-Gravel Hearing in Kansas

STATE FREIGHT rate authorities conducted a preliminary hearing December 12 in Topeka, Kan., on proposed changes in intrastate rates on sand, gravel, crushed stone and kindred commodities.

Attempting to meet motor trucks and local competition, Kansas railroads have filed with the state corporation commission a number of applications for rate reductions. The state authorities requested that carriers furnish them full records showing the volume of sand, gravel, crushed stone, etc., hauled during the nine months ended September 30, 1933, and the percentage of such volume that was subject to special or emergency rate.

Cement Rate "Preferential"

WITH ONE MEMBER dissenting, a division of the Interstate Commerce Commission has decided the cement rates from Dewey, Okla., and other points in the Kansas gas belt to Wyoming and Colorado destinations are reasonable, but unduly prejudicial and preferential in relation to rates from Portland and Boettcher, Colo., and Laramie, Wyo., to the same destination. Equitable rates must be established not later than March 5.

Rate Saving $35,000 a Year

RECEIVERS of sand, gravel, crushed stone, etc., in Birmingham, Ala., anticipate a saving of approximately $35,000 a year as a result of the Interstate Commerce Commission decision (see page 43, ROCK PRODUCTS, November 25, 1933) to deny the petition for elimination of joint line rate schedules and the substitution of the single line rate schedules on a higher level.

(*Additional traffic news on Page* 53.)

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.
Consulting Specialist, Pittsburgh, Pa.

Volume Change of Cements. The increase in fine grinding of cements reduces the chance that strength specifications will not be met, but raises the question of whether volume changes are not apt to be greater. To shed light on this question, also on the effect of other conditions, O. Goffin and G. Mussgnug have performed a series of experiments on 3-in. cubes at plastic consistencies in 1:3 mixes. Volume changes were followed during water storage, combined storage, and drying in air to the nearest 0.0005 mm. Drying was carried out at about 20 deg. C., and at a relative humidity ranging from 50 to 58%.

Of four cements having 2, 4, 8 or 12% residue on the 176-mesh sieve, the finest ground showed slightly more swelling in the wet storage and somewhat more shrinkage in the air. In another series of three cements with a free lime content of 1, 2 and 3%, as a result of hydrating the free lime, marked growth was observed during wet storage, but in contact with air the shrinkage was appreciably reduced. Variation in the silicate modulus ranging from 1.5 to 2.7 did not seem to have any appreciable effect. If more gypsum than 4% is added more expansion was observed in water storage with a slight decrease in the subsequent shrinkage during contact with the air. Calcium chloride in these experiments had little effect during wet storage but seemed to cause a considerably greater amount of contraction during the drying out. This last observation should help to dispel the impression that, since calcium chloride itself is hygroscopic, it should prevent the drying out of concrete. As a matter of fact, almost all the calcium chloride is in combination with the aluminate in the cement. *Zement* (1933), V. **22**, No. 40, p. 549.

Swelling During the Hydration of Cements in a Large Excess of Water. According to Renè Dubnissay and Henri Lafuma, when about 10 grams of a rapid setting or medium rapid setting natural cement is shaken with about a liter of water, the products of hydration appear to occupy a tremendous volume. When portland cement is used the volume is not so great, while with slag or aluminous cements the phenomenon is lacking. The reason for the great bulking is the formation of very long needles about 100 times as long as thick. The length of these crystals depends upon favorable conditions of alkalinity, too high a concentration of lime bringing about the formation of a larger number of short crystals, strong agitation breaking up the long needles reduces the volume. The needles are either calcium aluminate or sulfo-aluminate, perhaps the former, because on mixing potassium aluminate and calcium nitrate long thin needles, analyzed as $3CaO, Al_2O_3, 2IH_2O$, can be obtained. *Revue des Materiaux de Construction et de Travaux Publics,* (1933), No. 289, p. 325.

Staining and Efflorescence on Masonry. E. Rengade repeating experiments made at Purdue University (Bull. No. 33, 1928) finds similar staining on a French limestone from Fournonnes. He also found staining with porous cups, but was able to prove that this was not caused by iron but by traces of organic matter found in the cups. If a cement or mortar to be examined is placed in the bottom of a porous cup, which is then set in a saucer of water, any salts dissolved out accumulate at the top of the cup, conveniently for analytical determination. *Revue des Materiaux de Construction et de Travaux Publics* (1933), No. 289, p. 332.

The Yield of Lime Putty and the Building Industry. Dr. W. Dawihl discusses some of the factors affecting the yield of lime putty or of dry hydrates. Emphasis is laid on the chemical analysis of lime. As is well known, a very pure lime tends to give a large volume of putty, but a rather low yield of dry hydrates because of the violence of the reaction. The presence of silica or alumina tends to reduce the yield by causing the clumping together of the calcium hydroxide particles, which are apparently about two to four microns in dimension, for the different limes studied. In a dry hydrate, on the other hand, the greater the purity of the lime, the greater the clump formation, according to microscopic observation. The table gives some interesting results:

Limestone Analysis:	A	B	C	D
CaO	99.5%	96.4%	91.3%	69.2%
MgO	trace	2.0	7.3	10.5
SiO_2 (acid soluble)	trace	1.6	1.4	19.2
Yield, cu. ft. per 100 lb. quick lime:				
Putty from quick lime	5.0	3.9	4.1	2.2
Dry hydrate	2.6	3.1	3.4	2.3
Putty from hydrate	3.3	4.5	5.0	3.3

Two causes are noted for the differences in yield: First, the breaking down of burned lime into an extremely fine powder *during slaking,* as determined by the nature of the original limestone. Second, the increase in volume due to the absorption of a layer of water around each grain of hydrate in the putty. *Tonindustrie Zeitung* (1933), V. **57**, No. 82, p. 963; No. 84, p. 988.

Comment: One hundred pounds pure quick lime will produce slightly more than one net cubic foot, the absolute volume, of hydrate. In 5 cu. ft. of putty, outside of the hydrate particles plus their shell of absorbed water, judging by random packing of spheres in a box, there will be perhaps 50% of 5 cu. ft. or 2.5 cu. ft. of free water. Assuming a layer of adsorbed water about one micron thick, the original hydrate particles would have a mean effective diameter of slightly less than 4 microns which is in agreement with the microscopic observations.

Whereas the yield is very important in determining the cost for building purposes, too high a yield is apt to have in many cases an adverse effect on strength and durability. When all the water found in the putty, which gives it the high yield, evaporates, a considerable amount of shrinkage plus pore space development results.

The Combination of Lime with Titanic Acid. I. Parga-Pondal and K. Bergt heated mixtures of $CaCO_3$ and TiO_2 to various temperatures and determined the free lime and found a 1:1 combination up to 1300 deg. C. Above this temperature evidence of the combination of 1.5 mole of lime per mole of titania. It is possible that more lime would combine at still higher temperatures. In mixtures of CaO, TiO_2 and SiO_2 no evidence was obtained of any ternary compound formation. Replacement of part of the silica by titania results at first in bringing more lime into combination, but it soon drops again. *Tonindustrie Zeitung* (1933), V. **57**, No. 83, p. 976; No. 85, p. 1000.

The Impregnation of Cement Mortar with Sulfur. Georg Saenger has repeated the work of Kobbe (*Engineering News-Record* (1926), V. **96**, No. 23, p. 940) and found a slower rate of penetration than there reported, probably because most of the German specimens were more compact. By placing the specimens first in a sulfur bath heated to a higher and then in on at a lower temperature somewhat better results were obtained. A very marked increase in strength was obtained through impregnation, sometimes the leaner specimens giving higher results than others higher in cement. The final strengths were almost independent of the water-cement ratio. Abrasion resistance was greatly increased by impregnation. On the other hand, the resistance to chemical corrosion was not hindered, but was, apparently at times, speeded up. Concrete made of one slag cement high in lime and alumina after impregnation when wetted usually soon fell in pieces, but it is believed that other slag cements might work satisfactorily. After impregnation, specimens stored in water for two years began to show cracks, so that impregnation with sulfur is not suitable for any concrete which is to be exposed to moisture. *Zement* (1933), **22**, No. 39, p. 537; No. 41, p. 566.

Wet Sieving. While the determination of the residue on a given sieve obtained with the aid of water to wash the fine powders seems to be more complete, more easily made and requires much less time than dry sieving, R. Feret believes quite a bit more work should be done before being willing to accept wet sieving as fully as satisfactory as present standard methods. *Revue des Materiaux des Construction et de Travaux Publices* (1933), No. 288, p. 390.

Effect of Different Materials Placed Between the Specimen and the Testing Machine on the Compressive Strengths. A report from the laboratory of the cement plant of Lambert Freres et Cie. give results for a variety of materials interposed between the cube and the testing machine. The apparent compressive strengths increased with the hardness of the plate used. Soft steel caused a loss of about 3%, while rubber reduced the results about 60%, with a variety of other fibrous materials in between. When a sheet of rubber was used, the specimen split in two, indicating a break more in flexure than in true compression. It is for this reason that the proposed French standard specification, covering compression testing, will read "Without any interposition of foreign bodies." It is important also that the surfaces of the specimens and of the testing machine plates be true planes. *Revue des Materiaux de Construction et de Travaux Publics* (1933), No. 389, p. 337.

The Effect of Lime Content and the Properties of Cement Having Ash or Stone-Dust Admixtures. The question of lime set free during the hydration of portland cement and its potential harmful effect has been receiving a great deal of attention not only in the United States but also in Europe, and much more during the present year than ever before. A number of cements are on the market in various parts of the world where silicious admixtures have been ground with standard portland cement with the hope of improving the quality. Richard Grun and Hugo Beckmann report on observations made on the effect of grinding either ashes produced in burning powdered coal or ground shale with portland cement. In general, they observed compressive strengths in proportion to the amount of portland cement in a given volume of concrete. In contact with aggressive solutions a similar result was observed, the resistance varying with the portland cement content of the specimens. These results confirm the opinion Prof. Grün has expressed before, that such finely ground materials may have beneficial action when added in reasonable amount as admixtures, but not as substitutes for cement. *Tonindustrie Zeitung* (1933) **57**, No. 70, p. 822; No. 71, p. 832.

Slurry Drying in the Cement Industry. A series of articles by representatives of several German firms manufacturing cement-making machinery considers various means of drying slurry by means of the waste heat from the kilns. Zollikofer, of Fellner and Ziegler, describes a special arrangement of chains hung in the long part of the kiln against which the slurry is sprayed under a pressure of 90 to 120 lb. per sq. in. It is claimed that the chains act as an effective heat interchanger whereby savings in fuel of 25% are obtained together with a capacity increase of about 17%. For forcing the slurry into the kiln a new double-acting membrane pump has been developed requiring very little power. Good results are obtained by increasing the diameter of the kiln where the drying takes place.

Karl Köntgen, of the Miag., describes their calcinator in which the slurry is dried so that it passes to the kiln in the shape of granules and the waste gases leave it at 90 to 120 deg. C. A saving in fuel of 20 to 30% is claimed. A rotating drum is used with a grating outside and filled in such a way that the gases pass through canals counter current to the slurry. As the gases meet considerable resistance a fan is used to maintain the draft. The calcinator and fan together require about 50 hp.h. for 200 tons of clinker. The calcinator is set immediately above the feed end of the kiln and does not require much space.

Schmidt, of the Krupp-Grusonwerk, describes another system of hanging chains whereby good results are obtained. With their arrangement they have been able to burn a kg. of clinker with 1600 heat units from a slurry having 41% water. Of this requirement 300 units were lost in the gases and about 210 by radiation and conduction. By passing the waste gases through a revolving grating filled with hollow, heat-interchanging bodies, the gas temperature was reduced to 100 deg. C. before it was drawn off with the aid of a fan and sent up the chimney. At the point where the slurry gets quite dry it tends to adhere to the apparatus and must be vigorously broken up. This auxiliary apparatus requires 5.4 kw.h. per ton of clinker and an increased capacity of 25% is claimed, together with a decrease in fuel consumption of 25%. *Tonindustrie Zeitung* (1933) **57**, No. 75, p. 879; No. 77, p. 904.

Dolomite Formation in Portland Cement Concrete. G. Kathrein is afraid that concretes in contact with soils containing any appreciable amount of magnesium compounds are apt to suffer as a result of dolomite formation. Calcium bicarbonate being so much more soluble than magnesium bicarbonate, whenever a solution of the latter comes in contact with portland cement a base exchange takes place with a weakening of the concrete. However, K. was able to show only 7 to 10% loss in strength after eight months' exposure to magnesium carbonate, and since this is hardly greater than the experimental error the possible harmful effect has yet to be demonstrated. *Tonindustrie Zeitung* (1933) **57**, No. 73, p. 859.

Patent Abstracts

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington, D. C. Complete copies may be obtained by sending 10c to the Commissioner of Patents, Washington, D. C., for each patent desired.

Process for Bonding Cement and Gypsum. The process is simply to add a chloride, such as calcium chloride, for example, or some other salt that will have the same effect to the cement. The chloride may be in solution and used to gage the cement or it may be added as a dry powder, such as "Cal." One to two pounds of chloride per gallon of water are usually satisfactory, although the patent covers mixtures containing from ½ lb. to 5 lb. per gallon. Previous patents of the inventor cover the preparation of the surface of the gypsum with a chemical solution and the applying of a granular coating to the gypsum to which the cement will adhere.—*Clyde M. Chapman, U. S. Patent, No.* 1,874,170.

Acoustic Plaster. This is a gypsum plaster using Keene's cement, second-settle calcined gypsum or first-settle gypsum aged several months. The inventor prefers, however, to use a stucco made according to the Brookby Patent, No. 1,370,581 as a base. Two formulas are given, one of which is:

No. 5 (Brookby) stucco	500 lb.
No. 4 silica (95% between 30 and 40 mesh)	250 lb.
No. 7 silica (90% between 10 and 20 mesh)	250 lb.
Mixed pumice (70% between 20 and 30 mesh)	600 lb.
Retarder	1 lb. 8 oz.
Powdered soap bark	9 oz.

Granulated marble is used in another formula in the place of the silica, or ground quartz.—*Carlisle K. Roos, Assignor to U. S. Gypsum Co., Chicago, Ill. U. S. Patent No.* 1,871,806.

Cement Size. The patent covers a size made of portland cement with such substances as whiting, amorphous silica, china clay, etc., and a neutralizer and adhesive made of casein (for which soap may be substituted) borax and hydrated lime. The inventor says this will eliminate the trouble from free alkalis in the cement or mortar to be covered and produce a firm, neutral outer coating to which oil paints, enamels and the like may be applied. A mixture given in the patent specifications contains: Portland cement, 46.8%; whiting, 10.6% ; amorphous white silica, 10%; china clay, 5.9%; alum, 4.7%; talc, 4.7%; pigment, 0.8%. The neutralizer and adhesive with which this is mixed consists of: Lactic casein, 5.5%; sulphuric casein, 5.5%; borax, 1.8%; hydrated lime, 3.5%. Soap (11%) may be substituted for the casein and this is covered by the patent. *W. P. D. Moross, Assignor to American Cement Paint Co., Rossville, Ga. U. S. Patent No.* 1,861,317.

Cement Industry's Code Now *Law*

Provides for Allocation of Available Business; Control of New Productive Facilities; Amortization of Obsolete Plants

THE President of the United States approved the Code of Fair Competition for the cement industry November 27 and the code became law 10 days later—December 7. In transmitting the code to the President with his recommendation for approval National Recovery Administrator Johnson expressed his opinion as to the economic effect of the code as follows:

"Comparison of the production of portland cement in the years 1928 and 1932, shows a decline of 54%. Comparison of number of persons employed by the industry shows a decrease from 34,244 employes in 1928, to 11,941 in February, 1933, or a decline in employment of 68.8%. It is estimated that based on employment in 1932, the adoption of the average 36-hour week as proposed in the code will cause absorption by the industry of 5,618 additional workers and a payroll increase of approximately 40%.

"The approval of this code is expected to:

"(1) Stabilize the industry and prevent economic disturbance due to price wars.

"(2) Protect dealers and the consumer against undue monopolistic tendencies of the industry.

"(3) Preclude the possibility of uncontrolled abuses due to the multiple basing system."

High Lights

A CODE AUTHORITY of seven members elected by the Board of Trustees of the Cement Institute.

The Board of Trustees of the Cement Institute to develop an equitable plan for allocation of available business.

The Cement Institute may petition the President of the United States to prohibit the erection of an unneeded new plant, or an increase in productive capacity of a present plant.

No sales below cost of manufacture except to meet an established competitive price—cost includes a proportion of overhead, but not interest or development charges.

Multiple basing point prices established by open price system, requiring 5 days' notice of change.

Salesmen on salary basis only.

Selling methods covered very specifically.

THE CODE

Article I—Purposes

To effectuate the policies of Title I of the National Industrial Recovery Act, the following provisions are submitted as a code of Fair Competition for the Portland Cement Industry, and upon approval by the President shall be the standard of fair competition for such industry, and shall be binding upon every member thereof.

Article II—Definitions

1. The term "Portland Cement Industry" as used herein includes the manufacture and sale by manufacturers of Portland Cement.

2. The term "employee" as used herein includes anyone engaged in the Portland Cement Industry, in any capacity, receiving compensation for his services, irrespective of the nature or method of payment of such compensation.

3. The term "employer" includes any enterprise by whom any such employee is compensated or employed.

4. The term "member of the industry" as used herein includes any enterprise engaged in the industry as above defined.

5. The term "district" as used herein means the geographical producing district as now or hereafter designated by the United States Bureau of Mines or other Governmental Agency, or as may hereafter be determined by the Code Authority.

6. The term "productive capacity" as used herein shall mean the productive capacity of the industry as determined by the United States Bureau of Mines.

7. The term "Institute" as used herein shall mean The Cement Institute.

8. The term "Board" as used herein shall mean the Board of Trustees of The Cement Institute.

9. The term "plant" as used herein shall mean a Portland Cement Manufacturing Plant.

10. The terms "President" and "Act" and "Administrator" as used herein, shall mean respectively the President of the United States, the National Industrial Recovery Act, and the Administrator of said Act.

Article III—Labor

A. General. — 1. Pursuant to subsection (a) of Section 7 of the Act, and so long as this Code shall be in effect:

(a) Employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection;

(b) No employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing;

(c) Employers shall comply with the maximum hours of labor, minimum rates of pay, and other conditions of employment, approved or prescribed by the President.

2. No person under 16 years of age shall be employed, and no person under 18 years of age shall be employed in any hazardous occupation in the industry.

3. Within each State, no provisions of this Code shall supersede any laws of such State imposing more stringent requirements, regulating the age of employees, wages, hours of work, or health, fire, or general working conditions, than are imposed under this Code.

4. Employers shall not reclassify employees or duties or occupations performed by employees to defeat the purposes of the Act.

B. Hours. — 1. Except as hereinafter otherwise provided, on and after effective date no employee shall work or be permitted to work in excess of forty-two (42) hours in any one week or eight (8) hours in any one day; nor more than thirty-six (36) hours per week averaged over any half calendar year, excepting, however (a) employees engaged in emergency maintenance and repair work involving breakdowns or protection of life and property, and (b) employees in packing and shipping departments, who shall not, however, work more than ten (10) hours in any one day or thirty-six (36) hours per week averaged over any half calendar year. If any employee on an hourly rate works in excess of 36 hours per week averaged over any half calendar year the wages paid for such excess shall be at the rate of not less than one and one third (1⅓) times the regular hourly rate.

2. No clerical or office employee shall work or be permitted to work in excess of forty (40) hours in any one week.

3. The maximum hours specified in the foregoing sections of this Article shall not apply to executive, administrative, supervisory, or technical employees who are paid thirty-five ($35) dollars or more per week, nor to sales staff employees.

4. No employee shall be permitted to work for a total number of hours in excess of the maximum hours specified in the foregoing sections of this Article whether employed by one or more employers.

C. Wages. — 1. Except as hereinafter otherwise provided, no employee shall be paid at less than the hourly rates specified for each of the twelve geographical districts as set forth in exhibit "A" of this Code, as follows:

District Number:	*Minimum Wage per Hour*
1	40c
2	40c
3	40c
4	40c
5 Except (a)	40c
(a) Jefferson and Meade Counties, Ky.	38c
6	30c
7 Except (a) and (b)	40c
(a) St. Louis Co., Minn.	37c
(b) Ralls County, Mo.	37c
8	40c
9	30c
10	40c
11	40c
12	40c

2. When the hourly rate for the same class of work on July 15, 1929, was less than 40 cents per hour, employers shall not pay less than the hourly rate on said date and in no event less than 30 cents per hour.

3. Untrained labor for a period not exceeding three (3) months and employees who by reason of old age or physical infirmities are not capable of normal productive effort shall be paid not less than 80

per cent of the minimum wage rates, but the total number thereof at any one plant shall not exceed 5 per cent of the total number of employees engaged by any employer in any one plant at any one time.

4. The foregoing provisions of this section established a minimum rate of pay regardless of whether an employee is compensated on a time rate, piece rate, or other basis. The rates of pay hereinbefore provided shall not be understood to be the maximum rates of pay for the respective districts.

5. The amounts by which wages in the higher paid classes of employees have exceeded wages in the lower paid classes of employees, shall be maintained, having in view long-standing wage differentials.

6. Female employees shall not be employed after 6:00 p. m.

7. Each employer shall post at a conspicuous place at each plant the minimum wages and maximum hours under this Code.

Article IV—Administration

To effectuate further the policy of the Act a Code Authority is hereby constituted to cooperate with the Administrator in the administration of this Code.

A. Organization and Constitution of the Code Authority.—The Code Authority shall consist of seven individuals, or such other larger number as may be approved from time to time by the Administrator, to be selected as hereinafter set forth. The President, in his discretion, may appoint not more than three additional members without vote to represent the Administrator.

1. The Board shall elect the Code Authority. The persons so elected shall, subject to changes at any time by the Board, serve on such Code Authority for such term as the Board shall determine.

The Board shall be made up as follows:

(a) One member to be chosen from each district.

(b) Trustees at Large, not to exceed seven (7) in number, shall be chosen by those members of the Board who represent the cement districts.

(c) The President, the Vice Presidents, and the Treasurer of the Institute shall be ex-officio members of the Board with full power to vote.

The members of the Board to represent the cement districts shall be elected by the members of the industry who participate in the activities of the Code Authority, as provided in Section B, subsection 8 below, in the respective districts by a majority vote of such members in each such district to serve for the term of one year and until their successors are elected and have qualified, and the members of the Board, so elected, shall elect the Trustees at Large; provided, however, that any member of the Board elected to represent any cement district may be recalled by a majority vote of the members of the industry in any such cement district in the event of the change in status of such Trustee or if, for any other reason, any such Trustee is not considered to be representative of the members of the industry in such district and, in the event of such recall, such members shall elect, by a majority vote, a Trustee to fill the unexpired term of the Trustee who has been recalled; a majority of the members of the Board shall have like power with respect to any Trustee at Large.

In the event of a vacancy in the Board, such vacancy shall be filled for the unexpired term of the Trustee whose vacancy is to be filled in the same manner as such Trustee was elected a member of the Board.

In the event of the inability of any Trustee elected to represent a cement district, or of any Trustee at Large to attend any meeting of the Board or of the Institute or of any committee or committees thereof, the members of the industry in such district, with respect to Trustees representing cement districts and the other Trustees at Large, with respect to any such Trustee at Large, shall have the right, from time to time as the occasion may require, to elect an Alternate Trustee to attend any such meeting or meetings who shall have such authority to represent the members of such district or to act as Trustee at Large as may be prescribed by such members or by such other Trustees at Large. Within the limits of the authority conferred upon him, as herein provided, any such Alternate Trustee shall have the right to vote and to act in all respects in the place of the member of the Board whose place he fills.

2. The Institute or its successors or any trade or industrial association participating in the selection or activities of the Code Authority, shall:

(1) Impose no inequitable restrictions on membership;

(2) Submit to the Administrator true copies of its Articles of Association, By-Laws, Regulations, and any amendments when made thereto, together with any other information relating to membership, organization, and activities as the Administrator may deem necessary to effectuate the purposes of the Act.

3. In order that the Code Authority shall at all times be truly representative of the industry, and in other respects comply with the provisions of the Act, the Administrator shall provide such hearings as he may deem proper; thereafter if he shall find that the Code Authority is not truly representative, or does not in other respects comply with the provisions of the Act, he may require an appropriate modification in the method of selection of the Code Authority.

B. Powers and Duties of the Code Authority.—In addition to the powers and duties herein specifically conferred upon the Code Authority, it shall have the following duties and powers to the extent permitted by the Act and subject to the right of the Administrator by review to disapprove or modify any action taken by the Code Authority pursuant to this Code.

1. The Code Authority shall be the general planning, coordinating, and administering agency of this Code. It may make such rules and regulations as may be necessary for the conduct of its business in the administration of this Code.

2. The Code Authority may designate the Institute or such other committees or agents, and may delegate to them such of its powers as it may deem necessary for the administration of this Code; provided, however, that the Code Authority shall not be relieved of final responsibility with respect to any such delegated powers.

3. The Code Authority shall, upon complaint of interested parties, upon request of the Administrator, or upon its own initiative, make such inquiry and investigation as to the operation and observance of this Code as may be necessary and report the results thereof to the Administrator for such action by him as may be in accordance with law.

4. No member of the Code Authority or of any committee designated by it shall participate as such member in a proceeding in which he is interested, either as complainant or as respondent, or in which he is in any other manner directly interested; and in the event of any such disqualification, the remaining members of such Code Authority or committee shall certify such disqualification, together with the reasons therefor, to the President of the Institute, who shall promptly designate a person to sit as a special member of such Code Authority or committee for the purposes of any such proceedings; provided, however, that any such special member so appointed shall be selected from the same group of the industry as is represented by the member whom he replaces.

5. In order that the President may be informed of the extent of the observance of the provisions of this Code and of the extent to which the declared policies of the National Industrial Recovery Act are being effectuated in the industry, the Code Authority and members of the industry shall make such reports as the Administrator may require periodically or as often as he may direct. Each member of the industry shall make such sworn or unsworn reports to the Code Authority or to such agency as it may designate as to wages, hours of labor, number of employees, and such other matters as the Code Authority may require for the administration of this Code; provided, however, that any information furnished hereunder of a confidential nature as between competitors in the industry shall not be available to competitors nor published in such form as shall reveal the identity of any member of the industry furnishing such reports.

In addition to the information required to be submitted to the Code Authority, there shall be furnished to governmental agencies, such statistical information as the Administrator may deem necessary for the purposes recited in Section 3 (*a*) of the Act.

6. Any interested party shall have the right to complain to the Code Authority under such rules and regulations as it may prescribe in respect of any rule, regulation, order or finding made or course of action pursued by the Code Authority, and any interested party shall have the right to appeal to the Administrator under such rules and regulations as he may prescribe in respect to any decision, rule, regulation or course of action of the Code Authority, pursuant to any provision of this Code.

7. The Code Authority and/or the Board may, from time to time, make such recommendations to the President as it may deem advisable or necessary to effectuate the policy of the Act and to develop and maintain conditions of fair competition in the Industry; and any modification or additions to this Code recommended by the Code Authority and/or the Board shall, upon approval by the President, become part of and shall have the same force and effect as other provisions of this Code.

8. Any member of the Industry shall be entitled to participate in and share the benefits of the activities of the Code Authority, and to participate in the selection of the members thereof by assenting to and complying with the requirements of this Code and by either paying his reasonable share of the expenses of its administration or by becoming a member of the Institute. The reasonable share of expenses of administration shall be determined by the Code Authority subject to review by the Administrator on the basis of volume of business and/or such other factors as may be deemed equitable to be taken into consideration.

Article V—Safety Work

As an evidence of the general attitude of the industry toward its employees, the industry points with pride to its achievements in the field of safety. For many years the industry has occupied the premier position in safety accomplishments. It has been regarded as an exemplar in safety technic; it received the Joseph A. Holmes awards

for the years 1930 and 1932, which is more notable because during those declining and depression years, great difficulties were experienced in maintaining normal safety morale in plant organizations. Such results, in the opinion of the industry, can be attained only by the cooperative effort of constructive management and satisfied, intelligent employees. The safety movement in the industry is conducted by, and for many years has been one of the constructive activities of, the Portland Cement Association, an organization of the industry which is devoted to research, education and improvement and extension of the use of concrete. So far as practicable, the safety movement will be continued.

Article VI—Plan for Sharing Available Business

1. The Board is hereby authorized to formulate a plan or plans, within thirty (30) days after the effective date of this Code, unless such time shall be extended by the Administrator, for the equitable allocation of available business among all members of the industry or among members of the industry operating in one or more Districts, and for the control of cement inventory and to submit the same either to a meeting of all members of the industry or to meetings of members in the Districts affected, as the Board may determine, for approval, modification or rejection. Each member of the industry shall be entitled to receive notice of any such plan and to participate in any meeting or meetings of all members of the industry or of members in the District in which such member operates and, further, shall have the right to appear before the Board at any meeting at which any such plan is being considered for the purpose of presenting any facts or arguments relative thereto.

When any such plan shall have been formulated by the Board, the Code Authority shall present the same to the Administrator for consideration and the Code Authority shall represent the industry and the Board in conference with the Administrator with respect to any such plan; provided, however, that as regards any such plan the Code Authority shall have only such power to bind the industry or any subdivision thereof as shall have been conferred upon it by majority vote of the industry or of any subdivision thereof, and each member shall have the right to present his objections, if any, to the Administrator. The Code Authority shall collect and present to the Administrator such data and statistics as may be required in connection with any such plan together with a statement of the names of those members of the industry that approve and of those that disapprove such plan in whole or in part.

2. Any such plan shall be based on the following principles:

(a) It shall be fair and its benefits shall be equitably apportioned to all plants.

(b) It shall give due consideration to all pertinent factors including demonstrated productive capacity based on the clinker and/or cement production performance of non-obsolete plants and equipment.

(c) It shall in no way reduce the total production of all plants below what is necessary amply to supply demand.

(d) It shall not promote monopoly or monopolistic practices or oppress small enterprises.

Article VII—Increase in Productive Capacity

Prior to the construction or operation of a new plant, or the increase in the productive capacity of an existing one, or the movement of all or part of such a plant from one place to another, The Cement Institute, on receipt of such information, shall promptly collect complete information concerning existing productive capacity in the area in which the proposed new plant is to be located, together with data concerning consumption of cement in that area. If these data disclose that such new plant will result in further increasing the problem of over-production or over-capacity in such area, The Cement Institute may petition the President to prohibit the construction, or operation, of the proposed new plant, or the increase in manufacturing capacities of such existing plants. The provisions hereof shall not be construed to prevent the modernization of existing plants to improve quality of product and/or operating efficiency.

The Board may study the problem of permanent excess of productive capacity in any area and may from time to time prepare and submit to the Administrator for consideration plans for the closing down or amortization of the less economical plants.

Article VIII—Cost Protection

1. It shall be an unfair method of competition for any member of the industry to sell or offer to sell cement at less than his expenses of manufacture, provided, however, that any member of the industry may sell or offer to sell cement at below his own expenses to meet the competition of any other member of the industry whose price is not less than the expenses of manufacturing of such other member.

Manufacturing expenses as used herein, shall include all direct labor and material (which do not greatly vary per unit of production with volume of output), at cost or market whichever is lower, plus a proportionate share of all indirect expenses, inclusive of maximum depreciation and/ or depletion allowances computed according to Federal Income Tax procedure, but exclusive of any capital reserves, for purposes other than depreciation and/or depletion, and exclusive of interest paid and development expenses. Provided, that the distribution of such indirect expenses per unit of product produced shall be on the basis of an average rate of utilization of plant facilities by efficient producers.

Unless and/or until some other formula is submitted to, and approved by the Administrator, the average rate of utilization of plant facilities shall be determined as follows, to wit:

Each member of the industry shall send to an impartial agency appointed by The Institute, a consolidated income tax return for that portion (or all) of his operations, devoted to the manufacture of Portland Cement for each of the years 1927-1932, or such other period as, upon presentation of official data, may be determined to be fair and as will better effectuate the purpose hereof and be approved by the Administrator, together with a record of physical production, productive capacity, and sales in each of these years.

From these reports will be calculated the average rate of utilization of productive capacity by the one-third (⅓) portion of the industry which reported the lowest average per unit cost of production for such period.

This percentage of productive capacity (rather than full capacity) shall become standard for the distribution of indirect expenses and fixed charges for the purpose of determining the per unit manufacturing expenses, by every member of the industry.

2. In case of any complaint that a member of the industry has violated the above provisions of this Code, the Code Authority shall give to such member of the industry not more than seven (7) days, or such other reasonable time as may be fixed by the Code Authority, in which to present evidence of its compliance with the foregoing provisions. If the Code Authority is not satisfied by the proof furnished by such member, the matter shall be promptly referred to the Administrator who shall immediately select a certified public accountant to examine the cost accounting of the member of the industry complained against and notify such member of the selection made and request the consent of such member to the examination of its cost accounting by the certified public accountant so selected. If such member shall not, within two (2) days after receipt of notice from the Administrator, as above provided, furnish to the Administrator written consent to such examination or shall not thereafter make available to such certified public accountant all books and records necessary to complete the examination of the cost accounting of such member of the industry, then, and in either event, the Administrator shall forthwith refer the matter to the Federal Trade Commission which shall audit the cost accounting of such member of the industry and report to the Administrator, who may transmit a copy of such report to the Code Authority and to the member of the industry complained against, with the least practicable delay. In the event that the member of the industry complained against shall consent to the examination of its cost accounting by the certified public accountant selected by the Administrator after such accountant shall complete his report, such accountant shall report his findings to the Administrator and transmit a copy thereof to the Code Authority and to the member of the industry complained against. If, in the opinion of the Administrator, the report of such accountant shall sustain the contention of the Code Authority but is not acceptable to the member of the industry complained against, then the matter shall be referred by the Administrator to the Federal Trade Commission, as above provided. The decision of the Administrator on the report of the accountant selected by him or on the report of the Federal Trade Commission shall be final regarding the costs of the member of the industry complained against.

3. *Uniform Cost Accounting.*—The Code Authority shall prepare and adopt for general use throughout the industry, and submit to the Administrator for approval within thirty (30) days of the effective date hereof, a standard method or system of uniform cost accounting which shall specify all items and include all elements of manufacturer's cost. When so prepared, adopted, and approved, all members of the industry shall apply the principles and include all the elements thereof in determining their respective costs.

Article IX—Open Price—Market Stabilization

1. Each member of the industry shall file its prices and all terms and conditions of sale with the Code Authority within five (5) days after the effective date of this Code and make same public by broadcast quotations to the trade, so that competitors, the trade, and the buying public may at all times have accurate information relative thereto, and no member of the industry shall deviate therefrom except in the manner hereinafter provided.

2. Any member of the industry may from time to time change or revise its prices by filing notice thereof with the Code Authority; and no member of the industry shall anticipate, by quotation, sale, contract, or otherwise, any change or revision until after the same shall have been on file at least five (5) days at the office of the Code Authority.

At the expiration of such five (5) day period the said changes or revisions may, unless the effective date thereof shall be extended, be made effective, and thereupon shall be made public in the manner provided in Section 1 hereof.

3. Any member of the industry may meet the prices, terms, and conditions of sale, established by the above method, as of their effective date, and no member of the industry shall deviate from the prices, terms, and conditions of sale, so established, except in the manner above stated, and all members meeting such changes shall make same public in the manner provided in Section 1 hereof.

4. *Manner of Procedure on Price Changes.*—(a) (1) Declines shall be retroactive on all shipments made within five (5) calendar days before the effective date thereof.

(2) Advances shall be made effective five (5) calendar days after expiration of the notice period and the trade shall be given such notice.

(b) During the five (5) days prior to the effective date of an advance, current market orders may be booked at the prior price for shipment not more than 15 days from the date the advance becomes effective.

(c) Each specific work quotation shall contain a provision permitting withdrawal on five days' notice.

(d) After an advance in price all outstanding quotations on work for which bids have been opened, which quotations extend longer than fifteen days from the effective date of the new price, shall be withdrawn or revised to expire on such fifteenth day.

(e) All quotations at the prior price, made during the five-day notice period shall be confined to jobs on which bids are to be opened prior to ten days from the effective date of the new price. Such quotations may be closed by contract not later than fifteen days from the effective date of the new price.

(f) All quotations outstanding on jobs on which bids are to be opened later than ten days from the effective date of the new price shall be withdrawn, and any quotations made on such jobs during the five-day notice period shall be at the new price.

5. If the Code Authority has reasonable cause to believe, and the member filing same shall have been so notified, that any price filed at its office, as above provided, represents a price made pursuant to a violation of any provision of this Code, the Code Authority may, by notice to such member, extend the effective date of such price for a period of not more than ten (10) days in order that investigation may be made by the Code Authority pursuant to the provisions of Section 2, Article VIII.

Article X—Unfair Competition

For the purposes of this Code, the following acts shall constitute unfair trade practices and a violation of this Code:

1. Making or promising any bribe, gratuity, gift, or other remuneration, not filed and published in accordance with Article IX hereof, directly or indirectly to any purchaser or prospective purchaser or to any officer, employee, or representative thereof, for the purpose or with the effect of making a sale of cement; imitating any brand or trademark used by any competitor; inducing or attempting to induce in any manner the violation of any existing future sales order or future sales contract, or other existing contract between a member of the industry and his customer, with the purpose or effect of inducing or causing a breach of any such contract; circulating or disseminating false or misleading information by words or acts relative to the prices, credit standing, business integrity, or ability to perform contracts, of any competitor or the grade, quality, count, character, nature, origin, manufacture, weight, or preparation of his products.

2. To compensate salesmen in any manner other than upon a fixed salary and full-time basis.

3. To divert or permit purchasers or users of cement to divert shipments of cement from one destination to another destination, the result of which will enable the purchaser or user to secure cement at less than the member of the industry's published market price at the point of final destination.

4. The following practices, undertaken for the purpose or with the effect, directly or indirectly, of furthering the sale or use of a particular brand of cement shall constitute unfair trade practices and a violation of this Code:

(a) Except with permission of the Code Authority (and such permission, when given, shall apply to all companies in the marketing area affected) the purchase, by any member of the industry, of bonds, or other securities, issued for the financing of constructive work, either in the name of the member of the industry, its subsidiaries, or of individuals, or officers, connected therewith, or the acceptance of such bonds, or other securities, in payment, wholly or in part, for cement, or the advance, loan, or payment of any monies by a member of the industry for the purpose of inducing the purchase of cement, or to assume cost of Bidders' Bonds or to endorse or guarantee or in any way relieve a Bidder of the responsibility for or the expense of providing such bonds, unless such conditions shall have been filed and published in accordance with Article IX.

(b) For the purpose or with the effect of evading the provisions of Article IX of this Code, the purchase of fuel or other supplies, either directly or indirectly, or in the name of the company, or its subsidiaries, or of individuals, or officers connected therewith at prices above the market price thereof at the time of purchase.

(c) To make or permit to be made, either directly or indirectly, any secret payment or allowance of rebates, refunds, commissions, credits, or unearned discounts in the form of money or otherwise, or to secretly extend to certain purchasers special services or privileges not extended to all purchasers on like terms and conditions.

(d) The prepayment of transportation charges on shipments consigned to other than the member of the industry itself, except in the case of railroad freight charges to stations to which regulations require prepayment from any shipping point, or the payment of demurrage charges by any member of the industry on such shipments; provided, however, that the foregoing provision, except as to demurrage charges, shall not apply to shipments purchased directly by and consigned to departments of the United States or State Governments, unless such conditions shall have been filed and published in accordance with Article IX.

(e) Knowingly diverting or permitting to be diverted to other uses, cement shipped for a specific work project nor knowingly shipping on a specific work order or contract, an amount of cement in excess of the actual needs of such work.

(f) To entice maliciously the employees of a competitor with the intent or effect of interfering with the conduct of the business of such competitor.

(g) Knowingly to ship cement by any transportation agency which, for the purpose or with the effect of inducing or influencing the sale or purchase of cement, makes payments or concessions by rebates or otherwise.

(h) The payment, or offer to pay, directly or indirectly, any advertising expenses of purchasers or users of cement.

(i) Lavish, excessive, or undignified entertainment of purchasers or users of cement, or others connected therewith; donating funds, or providing banquets or other similar lavish entertainment for purchasers or users, or associations thereof; giving or offering to give premiums, personal gifts, gifts of cement, or gifts of any other commodity of substantial value to purchasers or users of cement.

(j) The sale by any member of the industry, directly or indirectly, of any commodity at a discriminatory price.

(k) Services to purchasers or users are proper under fair competition, if confined within the limits of advice and consultation. The furnishing of articles or facilities of a definite physical nature, whether by way of loan, lease, gift, or otherwise, resulting in monetary benefit to purchasers or users is discriminatory and shall constitute unfair competition.

(l) No member of the industry shall maliciously refuse to sell to, or maliciously interfere with the business of, dealers or users of portland cement purchased from a competitor, for the purpose of interfering with the conduct of the business of such competitor.

Article XI—Method of Selling and Marketing Cement

The Code Authority may, after the approval of the Administrator has been secured, authorize and approve such exceptions to or modifications of any of the following provisions as it may see fit for all members of the industry in the marketing area affected.

No member of the industry shall discriminate in prices, terms, and conditions of sale at the same time and place of delivery between purchasers or users of cement in the same class and similarly situated.

1. Except as otherwise specified, portland cement shall be marketed in each community through the building material dealers regularly serving such community.

2. Except as otherwise specified, the following buyers shall be sold direct by members of the industry at the same price and under the same terms and conditions of sales as to dealers:

United States Government.

State Governments, Counties, and Parishes when properly authorized to purchase cement for public improvements or maintenance.

Contractors doing any of the foregoing classes of work, except where such work is located entirely within cities, towns, or villages.

Railroads filing tariffs with State or Interstate Commissions, and contractors doing work for such railroads.

Owners or contractors buying for power development, flood control, and water supply projects that do not require dealer service

Concrete Products Manufacturers, including block, tile, roofing, pipe, piling, and all other precast concrete units when for their own manufacturing operations, but not for resale.

Commercial concrete mixing plants for their own processing operations, but not for resale.

3. Definition of a dealer: A cement dealer as used herein is one who has an established place of business where he is regularly engaged in selling portland cement and other building materials to the public, with facilities to serve the retail trade in a given

territory and able and willing to perform all functions devolving upon him in securing, performing, and protecting contracts for the delivery of portland cement for specific work on his account.

No member of the industry shall pay to any dealer any commissions or other remunerations for the sale of such member's cement.

4. Cement shall be marketed on the basis of a barrel, weighing 376 pounds net; and shall be delivered in the following manner:

(a) In cloth or paper sacks, four (4) sacks of 94 pounds net each constitute a barrel, or

(b) In bulk computed on weights on scales at the plants or en route.

5. Cement shall be marketed either on current or market orders for delivery within fifteen days, or on orders or contracts for future delivery beyond fifteen days.

Orders entered for fifteen days' shipment shall be subject to shipment on the fifteenth day without notice to the purchaser. Quotations on current orders shall be for immediate acceptance.

Cement purchased for delivery beyond fifteen days from date of purchase shall be sold either to cover "specific work" or for period requirements.

6. Application of Exhibits B and C. The booking of either specific work orders or period requirement contracts from the various groups of purchasers listed in sections 1 and 2 of this article shall be as follows:

(a) United States Government: Sell under contracts for delivery periods as specified in formal requests for bids.

(b) States: Projects on which construction contracts are awarded. Sell under specific work contracts. Such contracts shall be closed only after definite award of construction contracts. On request from States for cement prices on such projects, the prices quoted shall be not higher than the prices in effect fifteen days prior to the date on which such States receive construction bids and such prices shall be good for acceptance within fifteen days after such date for receiving construction bids.

Purchases for use by State Forces: If any department of the State undertakes construction work conforming to the general definition of a specific work project, sell under specific work contract. For requirements of the character of repairs and maintenance, sell under calendar quarterly contracts.

(c) Counties, Parishes, and Cities: Sell on calendar quarterly requirement contracts.

(d) Railroads: Sell on calendar quarterly basis for general requirements. Specific jobs requiring extended delivery may be sold under the plan outlined below for specific work contracts, provided the jobs are covered by appropriations, plans prepared and it is possible to definitely check the job for location and quantity. Contracts for such specific job shall be limited to shipment for such work only and shall be closed for a period of not to exceed one year from date of contract. Cement under such specific job contracts shall not be shipped to any town other than that provided in the contract nor shall it be diverted for use in general repair or maintenance work.

(e) Owners and Industrials: This title includes industrial projects and owners thereof, such as coal companies, manufacturing companies, street railways, packing houses, stockyards, cemeteries, light and power companies, and all public utilities except railroads having published tariffs and recognized by public service commissions as common carriers.

Sell for fifteen days' shipment only, on current or market orders; when work is done by the owner or industrial specific contracts shall not be made; when an owner or industrial awards a specific job to a contractor and the contractor buys the cement requirements, specific work contract shall be closed provided the job may be checked definitely as to location and quantity.

(f) Conduit construction or repair work by public utilities shall not be sold for extended delivery but shall be sold for fifteen days shipment only on current or market orders.

(g) Speculative residential work shall be sold for current delivery only. Any project involving more than one residence for one owner constitutes a speculative operation.

(h) Products Manufacturers: (1) Manufacturers of blocks, tile, roofing, and all Products manufacturers not included in (2) below, shall be sold on calendar quarterly contracts.

(2) Pipe manufacturers and concrete pile manufacturers: For specific jobs which can be definitely checked for quantity and location, sales shall be made on specific contract basis. In general such specific contracts shall be confined to public work awarded by contract where the cement requirements can be accurately figured.

An order held by a pipe manufacturer for the year's requirements of a city, county, state, industrial, or contractor shall not constitute a specific job. Such orders as well as general requirements of the plant shall be sold only on calendar quarterly contracts.

(i) Commercial Concrete Mixing Plants: Shall be sold for fifteen days delivery or for specific job requirements as herein provided; but shall not be sold for general or period requirements.

7. Time of closing calendar requirement contracts. Contracts for any quarter shall be quoted or closed not earlier than the first day of the last month of the preceding quarter.

The basis of a contract (except on sales direct from member of the industry to user) shall be a binding order placed by the user with a dealer and a corresponding order placed by the dealer with the member of the industry.

8. Time and Manner of Closing Specific Work Orders. When a contractor has an order with a building material dealer for a specific work project, the member of the industry shall book from the dealer a purchase order for the required amount of cement to be invoiced at the member's market price at time of shipments. This order shall be binding on both parties. The parties shall agree in this order that if the member's price should advance, a specific work contract shall be entered into at the price prevailing prior to such advance, for the quantity of cement then required to complete the project. The dealer shall furnish the member of the industry, as the basis for such contract, his record of the amount of cement delivered to the contractor prior to the advance in price, together with a verified written estimate from a responsible representative of the contractor of the amount of cement still required to complete the work.

Specific work orders at prices prior to an advance in prices, but closed during the period immediately following an advance, as described in paragraph 8, shall be covered immediately by specific work contracts, but such contracts shall be supported by the dealer's record of prior deliveries and the contractor's written estimate of requirements as above stated.

9. The provisions of this Artcile XI are designed to meet present industrial and social conditions as they relate to the cement industry. But the Administrator and the Code Authority with the approval of the Administrator reserve the right from time to time, and after such hearing as they or either of them may deem necessary, to modify the foregoing provisions of this Article as conditions and circumstances may indicate to be necessary to effectuate the policy and provisions of the Act.

Article XII—Terms and Conditions of Sale

1. All future sales orders and future sales contracts for the sale of portland cement shall contain a definite statement of price, quantities, terms of payment, time and place of delivery, and all other terms of sale necessary to form a complete and unambiguous contract.

2. No member of the industry shall substitute for a contract or purchase order already executed and in force, a new contract or purchase order for the same requirements at a lower price or on more favorable terms to the purchaser than are contained in the original contract or purchase order.

3. Attached hereto and marked Exhibits B and C are forms of future specific sales orders, and contracts, the provisions, terms, and conditions of which have been agreed to by members of the industry as representing in substance the best practices within the industry.

4. Terms of payment shall be as follows: A cash discount of not in excess of 10c per barrel may be deducted from invoices paid in full within fifteen days from date of issue. Invoices not discounted are payable net thirty days from date of issue.

(a) Where purchases involve frequent shipments, a plan of semi-monthly remittance, based on a fifteen-day average, may be used as follows:

All invoices dated from first day of month to fifteenth day of month, inclusive, to be paid by the 22d of that month; and all invoices dated 16th to 31st, inclusive, to be paid by the 7th day of the following month:

(b) Cash discount shall not be allowed if remittance is forwarded after the expiration of the 15-day period, or semi-monthly period; or if deduction is made in the remittance for cloth sacks to be returned or in transit and not yet credited; or if the remittance consists in whole or in part of notes, trade acceptances, scrip, warrants (whether interest bearing or not), or any medium other than cash or bankable check for the full amount of the invoices upon which cash discount is deducted.

(c) The postmark date at point of mailing shall determine the date of remittance.

(d) No unearned discounts shall be allowed.

5. Package charges and allowances:

(a) When cement is shipped in cloth or paper sacks the price shall include the member of the industry's published deposit or leasing charges for cloth sacks or the selling charge for paper sacks and payment of such charges shall be required at the same time as the cement.

(b) When used cloth sacks are returned empty to the member of the industry the credit or allowance shall at all times be in accordance with the member's published terms and conditions of sale.

6. Invoices: Invoices shall be dated as of the date of shipment (provided where special and unusual conditions prevail, the members of the industry in the district or districts concerned, may, subject to the approval of the Code Authority, change this provision to conform to such special and unusual conditions) and shall contain full information as to price, quantity, kind of package, terms of payment, place of deliv-

eries, routing, amount of freight allowed, and any other data necessary to show fully all conditions entering into the sale. Any deviation or concession from these conditions is an unfair practice.

Article XIII—Standardization of Products

1. All Portland Cement marketed by members of the industry shall comply with the standard specifications for Portland Cement of the American Society for Testing Materials, and the American Standards Association, and/or the Federal Specification Board. Members of the industry may sell cement under modified Portland Cement specifications that are designed to meet special or unusual conditions not adequately or properly covered by the specifications hereinabove referred to, provided, however, that the price at which such modified Portland Cements are sold shall be filed with the Code Authority.

2. Every member of the industry shall guarantee his products to comply with all of the conditions of the specifications under which they are sold, but shall not be responsible for the improper use of cements and therefore shall not guarantee finished work, nor shall the member of the industry be responsible for condition of product after delivery.

3. No member of the industry shall pay or absorb, directly or indirectly, any charges for inspection or tests made by or on behalf of the purchaser to determine compliance with specifications therefor.

Article XIV

It is the consensus of opinion of the industry that each member thereof should bear his proportionate share of the burden of the cost of constructive cooperative activities approved and supported by the majority of the industry and whose benefits are common to all manufacturers.

Article XV

Nothing in this Code contained, excepting, however, the provisions of Article III, shall be deemed to apply to or affect the sale by any member of the industry of any products of the industry for direct shipment in export trade.

Article XVI—Modification

1. This Code and all the provisions thereof are expressly made subject to the right of the President, in accordance with the provisions of subsection (b) of Section 10 of N.I.R.A. from time to time to cancel or modify any order, approval, license, rule or regulation issued under Title I of said Act and specifically but without limitation to the right of the President to cancel or modify his approval of any provision of this Code or any conditions imposed by him upon his approval thereof.

2. Whenever the Administrator shall determine such action by him to be necessary to effectuate the policy of the Act, he may modify or cancel any action pursuant to this Code by any agency established thereunder.

3. Except as to the provisions required by the Act, this Code may be modified on the basis of experience or changes in circumstances, such modifications to be based upon application to the Administrator, on such notice and hearing as he shall specify and to become effective on approval by the President.

Article XVII—Monopolies

No provision of this Code shall be so construed or applied as to permit or promote monopoly or monopolistic practices, or to eliminate, oppress, or discriminate against small enterprises.

Article XVIII—Effective Date

The effective date of the Code shall be ten days after approval thereof by the President.

Exhibit A—Districts

The twelve (12) geographical districts as described by the United States Bureau of Mines are as follows:

District:
- No. 1—Eastern Pennsylvania, New Jersey, Maryland.
- No. 2—New York, Maine.
- No. 3—Western Pennsylvania, Ohio, West Virginia.
- No. 4—Michigan.
- No. 5—Wisconsin, Illinois, Indiana, Kentucky.
- No. 6—Virginia, Tennessee, Alabama, Georgia, Florida, Louisiana.
- No. 7—Eastern Missouri, Iowa, Minnesota, South Dakota.
- No. 8—Western Missouri, Nebraska, Kansas, Oklahoma, Arkansas.
- No. 9—Texas.
- No. 10—Colorado, Montana, Utah, Wyoming, Idaho.
- No. 11—California.
- No. 12—Oregon, Washington.

Exhibit B—(Specific Sales Order)

To .....
Name and Address of Cement Company
We have sold to .....Contractor .....Barrels of (Brand) .....Portland Cement for .....of
(Fraction or all)
his requirements on the following specific work awarded him:
(Character, description, and location of work, and name of owner)

We hereby place with you our order for the above quantity of (Brand)..... Portland Cement, to be packed in..... (sacks), for use on the above work, at your prevailing market price at time of shipment. subject to the conditions stated on both sides hereof.

We will desire delivery made, as the work requires, upon our instructions in carload lots, F.O.B. cars.....deliveries to be complete prior to .....

It is expressly understood and agreed:

1. That if you advance your market price prior to the completion of shipments on this order, you will, within ten (10) days of the effective date of such advance, enter into your standard form of specific work contract with us, at the price prior to such advance. for the quantity of cement that may at that date be required for the completion of the work covered by this order.

2. That as a basis for such specific work contract, we will supply you with our record of cement delivered to the contractor prior to the time of your advance in price, together with a written estimate from the contractor, or a responsible employee of the contractor, of the quality of cement then required to complete the work.

Signed: .....
Date: .....

Accepted:
.....Cement Company.
(Officer)
Date: .....

Terms of Payment.—On approved credit net cash 30 days, from date of invoice, or 10 cents per barrel discount for cash in 15 days from date of invoice.

If at any time the financial responsibility of Buyer becomes impaired or unsatisfactory to Seller, it reserves the right to require payments in advance or satisfactory security or guarantee that invoices will be promptly paid when due.

If Buyer fails to comply with terms of payment, or with any of the other terms of sale, Seller reserves the right to cancel unfilled portion of this order, without notice, Buyer remaining liable for all unpaid accounts. No waiver of such right shall be implied from any failure by Seller to exercise the same.

Package.—Cloth sacks bearing Seller's brands, in which cement herein contracted for is packed, are the property of Seller and are for a period of 90 days from the delivery by Seller of the said cement, leased by it to Buyer at a charge of 10 cents each. which charge is included in price for cement packed in cloth sacks and which charge Buyer agrees to pay at same time and on same terms as payment for cement is made.

Buyer agrees within 90 days of delivery of the cement to deliver to Seller, the owner, at its nearest plant, freight charges collect, as provided by railroad classifications and tariffs, properly bundled and so marked as to insure complete identification, the cloth sacks bearing Seller's brands, in which the said cement is packed, and Seller agrees to refund to Buyer 10 cents for each said cloth sack so delivered in good condition, subject to Seller's count and inspection, and to assume freight charges thereon. If for any reason freight charges (per railroad tariffs) are prepaid, they will be refunded by Seller upon presentation of Railroad Company's receipted freight bill or bill of lading.

For useless cloth sacks which have been wet, no refund will be made. Cloth sacks bearing other than Seller's brands will be held by Seller for 30 days subject to Buyer's order.

In the event that any of the said empty cloth sacks bearing Seller's brands are sold or otherwise disposed of by Buyer to any person other than Seller, the owner. Buyer agrees to pay Seller, as liquidated damages, 10 cents for each cloth sack so sold or disposed of.

If during the life of this order, Seller shall change its present charge for the lease of cloth sacks, or the liquidated damages, or both, it is expressly agreed that the said amount or amounts in the preceding paragraphs shall be changed accordingly, and the gross price specified herein for cement packed in cloth sacks shall be changed in accordance with the change in charge for lease of cloth sacks.

Price on cement packed in paper bags includes the paper bags, which are not returnable. Shipments in paper bags are made at Buyer's risk of breakage and resultant loss of cement.

(If cement company requires a deposit for cloth sacks, instead of leasing them, the following clauses are suggested):

Package.—The cloth sacks, bearing Seller's brand, containing the cement are not sold, but remain the property of Seller. Buyer agrees to return said cloth sacks, properly bundled and marked so as to secure complete identification, to Seller's nearest mill, within ninety (90) days from the date shipment of cement has been made.

Seller agrees to refund to Buyer the deposit of ten cents for each cloth sack so returned. This deposit has been included in the price herein stated and Buyer agrees to include it when payment for the cement is made.

It is, however, expressly understood that such cloth sacks must be delivered to Seller's mill in good condition and will be subject to mill count and inspection, and that no refund will be made for useless cloth sacks, nor for cloth sacks not of Seller's brand. Such cloth sacks, if received, will be held by Seller for thirty (30) days subject to Buyer's order and risk.

Seller agrees to pay carrier's freight charges on returned empty cloth sacks of Seller's brand after delivery to its nearest mill or to refund Buyer for freight charges prepaid on such shipments upon presentation of original bill of lading properly executed or original receipted freight bill.

If Seller shall change its present deposit required for cloth sacks, it is expressly agreed that the said amounts in the preceding paragraphs shall be changed accordingly and the gross price specified herein for cement packed in cloth sacks shall be changed in accordance with the change of deposit required.

Price on cement packed in paper bags includes the paper bags which are not returnable. Shipments in paper bags are made at Buyer's risk of breakage and resultant loss of cement.

Claims.—Claims for loss or damage will not be considered unless supported by seal record and railroad agent's acknowledgment on freight bill. Freight overcharge claims must be accompanied by original receipted freight bill.

Time of delivery.—Buyer shall give Seller shipping instructions in writing a reasonable time before shipments are to be made. If Buyer fails to order shipment within the time specified Seller shall have the right to extend the time for delivery of such cement, but shall not be obligated to do so, except at its option.

The Seller reserves the right to select the route and method by which shipments shall be forwarded, but no Seller can be required to favor any one route or method of transportation as against another by any joint action of the members of the industry or the Code Authority. Transportation charges per tariff applying from shipping point to place of delivery for route and method of shipment used, will be paid by the Buyer for the account of the Seller.

Seller shall not be liable to Buyer for any delays in manufacturing, shipping, or delivering said cement, caused by fire, strikes, lockouts, differences with workmen, accidents, war, insurrection, inability to secure cars, coal, or other material, governmental interference or regulation, delays in transportation or contingencies beyond Seller's control; and during the time of such delays

Seller shall have the right to pro rate among its various customers such cement as it may be able to manufacture and ship.

Specifications.—The cement shipped under this order shall conform to the present standard specifications for Portland Cement of the American Society for Testing Materials and the American Standards Association and/or the Federal Specification Board, and no other warranty is made in respect thereof. Seller having no control over the use of cement will not, therefore, guarantee finished work in which it is used, nor shall the Seller be responsible for the condition of cement after delivery to Buyer. Any charges incident to inspection or tests made by or on behalf of Buyer to determine compliance with specifications shall be paid by Buyer.

Seller's prevailing market price may be advanced by the amount of any increase in freight rates and/or any additional Government tax on freight and/or the amount of any tax on sales or contracts of sale effective after the date hereof without imposing on Buyer the obligation to enter into Seller's standard form of specific work contract, as provided in paragraph 1 hereof.

Exhibit C—(Form of Future Specific Sales Contract)

Agreement made this..... day of .....193...., between ..... Cement Company, hereinafter called Seller and..... ..... of ..... hereinafter called Buyer:

Seller hereby sells and agrees to furnish and deliver and Buyer hereby buys and agrees to receive and pay for Portland Cement in the quantity and on the terms and conditions hereinafter and on the back hereof set forth.

Description and quantity.—The purpose of this contract is to cover the purchase and sale of all the Portland Cement required to complete the work hereinbefore described, whether more or less than the quantity stated herein.

Buyer represents that the aforesaid number of barrels of cement will be used in the construction of the above-described work and agrees that no portion of such cement will be used for any other purpose without the written consent of Seller. If any of the cement shipped hereunder is reconsigned or diverted by Buyer from the place of delivery specified herein or used for any other purpose, Seller may cancel this contract and refuse to ship any more cement and Buyer agrees to pay Seller's market price at the place of final destination for such cement as has been diverted by Buyer from the place of delivery specified herein or has been used by Buyer for any other purpose than the purpose above specified; Buyer remaining liable for all unpaid accounts.

Place of Delivery.—F. O. B.....

Time of Delivery.—Prior to..... as required by the progress of the work. Buyer shall give Seller shipping instructions in writing a reasonable time before shipments are to be made. If Buyer fails to order shipment within the time specified Seller shall have the right to extend the time for delivery of such cement, but shall not be obligated to do so, except at its option.

Price.—

Per standard barrel, in cloth sacks... $....
Per standard barrel, in paper bags... $....
Per standard barrel, in bulk ..... $....

Price includes freight at present rates and will be increased by the amount of any increase in freight rate and/or any additional Government tax on freight and/or by the amount of any tax on sales or contracts of sale effective during the life of this contract. All shipments made on this contract will be at the current destination price of Seller on the date of shipment, if this price is below the contract destination price mentioned herein.

Terms of payment.—On approved credit net cash 30 days from date of invoice, or 10 cents per barrel discount for cash in 15 days from date of invoice.

If at any time the financial responsibility of Buyer becomes impaired or unsatisfactory to Seller, it reserves the right to require payments in advance or satisfactory security or guarantee that invoices will be promptly paid when due.

If buyer fails to comply with terms of payment, or with any of the other terms of sale, Seller reserves the right to cancel unfilled portion of this contract, without notice, Buyer remaining liable for all unpaid accounts. No waiver of such right shall be implied from any failure by Seller to exercise the same.

This contract is not assignable by Buyer without the consent of Seller in writing.

..... CEMENT COMPANY.
By ..... By.....
(Buyer) (Seller)

Package.—Cloth sacks bearing Seller's brands, in which cement herein contracted for is packed, are the property of Seller and are for a period of 90 days from the delivery by Seller of the said cement, leased by it to Buyer at a charge of 10 cents each, which charge is included in price of cement packed in cloth sacks and which charge Buyer agrees to pay at same time and on same terms as payment for cement is made.

Buyer agrees within 90 days of delivery of the cement to deliver to Seller, the owner, at its nearest plant, freight charges collect, as provided by railroad classifications and tariffs, properly bundled and so marked as to insure complete identification, the cloth sacks bearing Seller's brands, in which the said cement is packed, and Seller agrees to refund to Buyer 10 cents for each said cloth sack so delivered in good condition subject to its count and inspection, and to assume freight charges thereon. If for any reason freight charges (per railroad tariffs) are prepaid, they will be refunded by Seller upon presentation of Railroad Company's receipted freight bill or bill of lading.

For useless cloth sacks which have been wet, no refund will be made. Cloth sacks bearing other than Seller's brands will be held by Seller for 30 days subject to Buyer's order.

In the event that any of the said empty cloth sacks bearing Seller's brands are sold or otherwise disposed of by Buyer to any person other than Seller, the owner, Buyer, agrees to pay Seller, as liquidated damages, 10 cents for each cloth sack so sold or disposed of.

If during the life of this contract, Seller shall change its present charge for the lease of cloth sacks, or the liquidated damages, or both, it is expressly agreed that the said amount or amounts in the preceding paragraphs shall be changed accordingly, and the gross price specified herein for cement packed in cloth sacks shall be changed in accordance with the change in charge for lease of cloth sacks.

Price on cement packed in paper bags includes the paper bags, which are not returnable. Shipments in paper bags are made at Buyer's risk of breakage and resultant loss of cement.

(If cement company requires a deposit for cloth sacks, instead of leasing them, the following clauses are suggested):

Package.—The cloth sacks, bearing Seller's brand, containing the cement are not sold, but remain the property of Seller. Buyer agrees to return said cloth sacks, properly bundled and marked so as to insure complete identification, to Seller's nearest mill, within ninety (90) days from the date of shipment of cement has been made.

Seller agrees to refund to Buyer the deposit of ten cents for each cloth sack so returned. This deposit has been included in the price herein stated and Buyer agrees to include it when payment for the cement is made.

It is, however, expressly understood that such cloth sacks must be delivered to Seller's mill in good condition and will be subject to mill count and inspection, and that no refund will be made for useless cloth sacks nor for cloth sacks not of Seller's brand. Such cloth sacks, if received, will be held by Seller for thirty (30) days subject to Buyer's order and risk.

Seller agrees to pay carrier's freight charges on returned empty cloth sacks of Seller's brand after delivery to its nearest mill or to refund Buyer for freight charges prepaid on such shipments upon presentation of original bill of lading properly executed or original receipted freight bill.

If Seller shall change its present deposit required for cloth sacks, it is expressly agreed that the said amounts in the preceding paragraphs shall be changed accordingly and the gross price specified herein for cement packed in cloth sacks shall be changed in accordance with the change of deposit required.

Price on cement packed in paper bags includes the paper bags which are not returnable. Shipments in paper bags are made at Buyer's risk of breakage and resultant loss of cement.

Claims.—Claims for loss or damage will not be considered unless supported by seal record and railroad agent's acknowledgment on freight bill. Freight overcharge claims must be accompanied by original receipted freight bill.

The Seller reserves the right to select the route and method by which shipments shall be forwarded, but no Seller can be required to favor any one route or method of transportation as against another by any joint action of the members of the industry or the Code Authority. Transportation charges per tariff applying from shipping point to place of delivery for route and method of shipment used, will be paid by the Buyer for the account of the Seller.

Specifications.—The cement shipped under this contract shall conform to the present standard specifications for Portland Cement of the American Society for Testing Materials and the American Standards Association and/or the Federal Specifications Board, and no other Warranty is made in respect thereof. Seller having no control over the use of cement will not, therefore, guarantee finished work in which it is used, nor shall the Seller be responsible for the condition of cement after delivery to Buyer. Any charges incident to inspection or tests made by or on behalf of Buyer to determine compliance with specifications shall be paid by Buyer.

Seller shall not be liable to Buyer for any delays in manufacturing, shipping, or delivering said cement, caused by fire, strikes, lockouts, differences with workmen, accidents, war, insurrection, inability to secure cars, coal, or other material, governmental interference or regulation, delays in transportation, or contingencies beyond Seller's control; and during the time of such delays Seller shall have the right to prorate among its various customers such cement as it may be able to manufacture and ship.

Seller shall have the right, but shall not be obligated, to ship from any plant other than the one normally supplying the delivery point specified herein.

Bulk cement.—Shipments of bulk cement shall be invoiced and collected for on a basis of track scale weights nearest to point of origin.

Cement Industry in New Safety Drive

STARTING on January 1, the member plants of the Portland Cement Association located in the United States and foreign countries, are uniting in a unique new safety drive known as the 1934 NO ACCIDENT CAMPAIGN, the objects of which are set forth as follows:

(1) To slash lost-time accident totals for 1934.

(2) To eliminate fatal accidents in 1934.

(3) To earn more Association safety trophies in 1934.

(4) To restore cement to the lowest industrial accident rate in 1934.

(5) To build up the 1000 DAY CLUB—plants which have 1000 consecutive accident-free days—to the possible total of 30, in 1934.

Special attention is being concentrated on cement plants which have never succeeded as yet in completing a year without lost-time accident. A special feature announced for January is the citation of men of the industry who have completed ten years in cement mill operation without being involved in an accident.

Cement mills participating in the drive are all being supplied with a handsome safety flag of new design which will remain on the plant flag pole as long as the mill organization can retain a record free from accident.

Chairman J. B. John of the Association Committee on Accident Prevention and Insurance, has appointed a special sub-committee on new safety activities consisting of R. B. Fortuin (Pennsylvania-Dixie Cement Corp.), Chairman; M. A. Koffman (Southwestern Portland Cement Co.); Gordon C. Huth (Universal Atlas Cement Co.); F. C. Hunt (Nazareth Cement Co.), and J. B. Zook (Great Lakes Portland Cement Corp.), chairman of the Cement Section of the National Safety Council.

Belt Conveyor Theory and Practice

Part IV—Belt Conveyor Analysis

By G. F. Dodge, M. E.

[The three previous installments of this series of articles were published in ROCK PRODUCTS, December 5, 1931, April 9, 1932, and September 10, 1932.]

FIG. 10 is assumed to represent a condition that it is desired to meet. That is, to lift 800 tons of rock per hour 55 ft. in the shortest distance possible, the maximum pieces being 16 in. For this class of material an 18-deg. angle is the *maximum* and with that angle the working length of the conveyor becomes 178 ft. total 181 ft. From the capacity, speed, width chart (Part I, ROCK PRODUCTS, December 5, 1931) a 36-in. conveyor running 345 ft. per min. is found to satisfy the conditions both for size of material and using about two-thirds of the maximum speed. A 30-in. is too narrow for the size of material and would have to run about 510 ft. per min. A 42-in. could be used, but its speed would be low (about 245 ft. per min.) and inadvisable unless the material were *very* hard and sharp cornered.

A test computation for power and belt thickness is first made, using combined conveyor coefficients for roller bearings from Table VI (Part II, ROCK PRODUCTS, April 9, 1932) as follows:

From the table,

Conveyor coefficient ..... = 0.050
Load coefficient ..... = 0.033

Then in the power formula:

$$0.050 \times 345 = 17.25 = a$$
$$0.033 \times 800 = 26.40 = b$$
$$a + b = 43.65$$

$$\frac{(a+b) \times \text{length}}{1000} = \frac{43.65 \times 181}{1000} = 7.9 = c$$

$$\frac{\text{T.P.H.} \times \text{lift}}{1000} = \frac{800 \times 55}{1000} \ldots\ldots = 44.00 = d$$

$$c + d \ldots\ldots = 51.90 = e, \text{ belt hp.}$$

$$\frac{e \times 33000}{\text{Speed}} = \frac{51.9 \times 33000}{345} \ldots\ldots = 4960 \text{ lb} = \text{hp. pull}$$

Assuming that an arc of contact of 220 deg. can be obtained, Table VII (Part III, ROCK PRODUCTS, September 10, 1932) gives a lagged drive coefficient of 1.35 and the "drive pull" will be $4960 \times 1.35 = 6700$ lb. For this pull Table I (Part I, ROCK PRODUCTS, December 5, 1931) indicates a 9-ply 32-oz. belt, the weight per foot of which is 13.44 lb. with a 3/16-in. cover. The belt component is then $13.44 \times 55 = 739$ lb., which added to 6700 gives a total pull of 7439 lb., just about right for the thickest permissible belt, and calling for a 48-in. drive pulley (5 in. × 9 in. = 45 in.). However, this is an expensive belt and the thing to do is to see if a better drive coefficient cannot be obtained. A layout with a 48-in. drive pulley and a 24-in. snub (2½ in. × 9 in. = 22½ in.) shows that an arc of contact of about 238 deg. can be obtained by close snubbing and will have a coefficient of about 1.30. This is not enough saving to permit any belt reduction so another type of drive will have to be tried. A tandem drive like Fig. 4 (Part III, ROCK PRODUCTS, September 10, 1932) with a combined wrap of 400 deg. will give a coefficient (Table VII) of 1.09 and a drive pull of $1.09 \times 4960 = 5420$ lb. From Table I an 8-ply 28-oz. belt might be indicated. Its component 12.60 lb. × 55 = 692 lb., making a total of 6112 lb., an overload of about 6%,

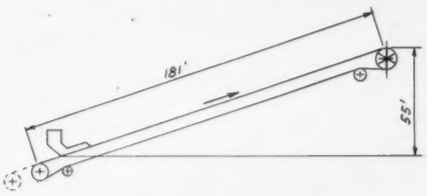


Fig. 10—Conveying problem

which makes it look as though the 32-oz. belt will have to be used. This is one-ply lighter than the first belt picked out and permits the use of 42-in. instead of 48-in. drive pulleys. However, an "exact" analysis may improve this.

Exact Analysis

Assume zero stress at the tail pulley. Table IX (Part III, ROCK PRODUCTS, September 10, 1932) shows that the top belt requires 68% of the friction *a* of the power formula, which carried through gives about 4860 lb. hp. pull at the head pulley, where the stress will be the maximum; 4860 lb. plus 692 lb. (belt component) = 5552 lb. at the head *with zero at the tail.* The friction of the bottom belt will be 32% of *a* for about 150 ft. of conveyor (what is left back of the drive snub), which put into belt pull is about 80 lb. The component of this length of belt will be about 573 lb. As friction opposes the component the difference, 573 — 80, or 493 lb., is available as slack side tension; 4960×0.09, or 5420 — 4960 = 460 lb. is needed, showing that the return belt will just produce the necessary slack side tension *with zero at the tail.* However, to prevent sagging between the idlers at the loading point some tension is needed at the tail. An extra idler at the tail to give closer spacing and help that condition is quite common practice. With the extra idler a pull of about 10 lb. per *in.* of width should suffice. This added pull will be exerted throughout the whole length of the belt and will therefore result in a maximum pull at the head of 5552 plus 360 = 5912 lb., enough of a reduction to permit using the cheaper 28-oz. belt, if we are willing to permit a 2½% overload, which is not a serious amount.

If the location of the tandem drive had been fixed at the tail of the conveyor, then the stress of 6112 lb. found with the drive coefficient added would have been the maximum, as the 460 lb. of slack-side tension would then take care of the sagging tendency. With the drive at the tail, the only way to hold the belt stress down to the 5912 lb. figure is by the use of one of the "unity coefficient" drives described, and in any possible arrangement this is the smallest figure that can be attained *with a full rated load.*

With *absolute* control of feed and material of a nature that would not damage the belt, a lighter belt and cheaper machinery arrangement could be obtained by "speeding" as shown by the following:

Assume the same conveyor, weight of material and tonnage as before. At a speed of 475 ft. per min. the load per foot on the belt will drop below what it would be with a full load of 75 lb. material and the 75 lb. idler spacing and power coefficients can be used. Then the computations become:

$$0.043 \times 475 = 20.4 = a$$
$$0.033 \times 800 = 26.40 = b$$
$$a + b = 46.80$$

$$\frac{(a+b) \times \text{length}}{1000} = \frac{46.80 \times 181}{1000} = 8.44 = c$$

$$\frac{\text{T.P.H.} \times \text{lift}}{1000} = \frac{800 \times 55}{1000} \ldots\ldots = 44.00 = d$$

$$c + d \ldots\ldots = 52.44 = e$$

$$\frac{e \times 33000}{1000} = \frac{52.44 \times 33000}{1000} \ldots\ldots = 3650 = \text{belt hp.} = \text{hp. pull}$$

With a drive coefficient of 1.35 the "drive" pull is 4930 lb. and a 7-ply 32-oz. belt is indicated. Its component, 11.76×55, is 652 lb., giving a total of 5582 lb., safely inside the value of the assumed 32-oz. 7-ply belt. To carry the investigation farther, a head tandem drive with a coefficient of 1.09 would give a drive pull of 3970 lb., indicating a 6-ply 28-oz. belt, a component of 595 lb. and a total pull of 4565 lb., an excess of about 5½%. An "exact" analysis by the method just described shows a pull of 4165 lb. at the head *with zero at the tail.* A slack-side tension of 320 lb. is required. The net component of the return belt is about 400 lb., or more than enough for slack-side tension. Adding the sagging allowance of 10 lb. per inch of width gives a maximum ot 4455 lb., still 3% above the value of a 6-ply 28-oz. belt. Another 15 ft. increase in speed will eliminate this 3% overstress in the belt and still be 10 ft. per min. below the recommended maximum.

With this last design the lightest advisable belt has been obtained. Fewer troughing

idlers are used and 36-in. drive pulleys are made possible. In other words, it is the most economical, "good practice," installation that can be made. In this case it should be noted that the pull necessary to prevent sagging is more than the required slack-side pull and therefore the tandem drive may be located at the most convenient point along the return strand without increasing the belt stress.

Lowering Conveyors

Lowering conveyors "in theory" are the same as lifting conveyors with the friction elements of the power formula *opposing* the efforts of the load, but several practical features enter to complicate matters.

First, the conveyor and load coefficients (Table VI) are figured to cover cold weather operation and indicate a retarding effect greater than actual for warm weather. They should be reduced 25 to 30% for figuring *retarding effect only*.

Second, except with the higher angles of inclination (which may be as great as for lifting), it is difficult to keep slack out of the carrying strand when the belt thickness is limited by figured pull. This is particularly true if the angle of the belt flattens out at the lower end. The simplest remedy for this is a stronger belt and more takeup tension.

Third, the motor may have to pull at one time and hold back at another, resulting in a material change in speed. If the rate of feed is *constant* this change of speed will produce a variable load on the belt and result in "hunting." The feeder should be driven by the same motor so that its speed is *proportional* to the belt speed. The minimum "theoretical" power at the motor *may* be that to start the feeder and empty conveyor, or to hold against the excess of load pull over friction, but in practice the motor should be 65 to 100% larger than it figures if these two pulls are anywhere near equal, and at least 50% larger than the excess load pull when this latter is materially the larger element. Use whichever gives the larger motor is a smooth running installation is desired.

Fourth, the drive should be lagged and at the tail (loading end) whenever the angle of inclination causes the load pull to exceed the friction pull, or loss of adhesion on the drive is likely to result.

Fifth, to avoid a movable discharge condition the head pulley will have to be fixed and an internal weighted take-up used. It should be located at the point of minimum stress in the belt and must be heavy enough to prevent sagging at any point of the top belt, and also to prevent being lifted at any time that the motor may be pulling on the bottom belt. If trouble is to be avoided, stresses in each strand of belt will have to be separately investigated for all critical points and for each condition of loading by use of Table IX, with due consideration to proper reduction of power coefficients of Table VI.

Sixth, a magnetic brake is the only simple type that can be used, and it must be capable both of holding the total load pull without any assistance from friction and to absorb the inertia of conveyor and load, stopping the conveyor in a reasonably short time with friction forces assisting.

Seventh, gear reductions and shafting must be strong enough for the greatest torque produced by either the motor or brake.

The preceding more important seven points will make clear that any but the shortest and simplest of lowering conveyors require much more careful analysis than other types.

Vertical Curves

Changes from level or slightly inclined sections to another section of greater inclination are generally made by use of vertical curves and it is usually desirable that the radius of curves be made as small as possible. This minimum radius will be governed by the weight of the belt and the stress in the belt at the point where the curve starts upward.

To find this stress, determine the pull at the tail pulley required for slack side tension for the fully loaded conveyor as indicated under the preceding "typical conveyor analysis" and add to this the hp., pull of friction (and lift if any) for the *loaded top strand* for that length between the loading point and the point of curvature. As the belt will not be stretched as much under this condition as when fully loaded, additional allowance must be made *if* the take-up *is not* automatic.

The radius within an error of 2% is given by the formula:

$$R = \frac{S}{W}$$, in which:

R = Radius in feet.
S = Pounds stress in belt.
W = Weight of belt in pounds per foot.

Due to possible over-adjustment of take ups, good practice uses a radius 25 ft. or more in excess of the minimum given by the formula.

Training of Belts

When a belt runs to one side constantly at any point it is due to bad adjustment of the third or fourth idler preceding the point of deflection, and that is where corrections should be made. If any particular point of the belt is continually to one side it is generally due to a crooked belt. This is most frequent at splices.

The best and simplest method of keeping belts in line is by tipping the idlers forward (in direction of belt travel) about ⅜ in. to ½ in. per foot. One manufacturer has furnished all idlers thus tilted for the past twenty years or more and another has adopted the idea in recent years. If the effect that this produces had been generally appreciated there would have been no call for the many expensive "training idlers" that have been designed, mostly by operators who were having trouble. The one place where this *cannot* be done is on reversible conveyors. On such the idlers *must* be perpendicular to the belt line and *careful* adjustment of idlers is the principal cure. On narrow belts guide idlers may be used but on wide stiff ones they do more harm than good.

Common Errors

A few of the most common errors of design that have come under the author's observation are:

Too close side clearance along the edge of the belt, particularly the return strand. Results are destruction of the edge cover, entrance of moisture and rapid destruction of the belt. As the return strand is generally pretty well out of sight so that bad alignment is not quickly discovered, a clearance of 5½ in. to 6 in. is not too much.

Sharp Angles

Sharp vertical bends from inclines to horizontal over troughing idlers. The belt is pulled down into the bends between the idler pulleys and rapidly destroyed. Such bends should preferably be made over bend pulleys instead of idlers. If the conveyor is not overloaded there will be little if any spillage. If, however, idlers are used the deflection of the belt from one idler to the next should be kept as low as possible—never over 3 deg. and preferably 2 deg. In other words an 18 deg. change in angle should be spread out over six to nine idlers, particularly if the belt stress is high at that point.

Failure to deflect the tail end of the conveyor on tripper lines where the tripper must come close to the tail (nearer than 40 ft. to 60 ft., depending on tension and weight of belt). Result, the belt is lifted into contact with the skirt boards and the cover destroyed.

Faulty Design

Poor design of skirt boards. A vertical edge over the belt even if faced with rubber will cause damage to the belt because the belt will sag enough between idlers to permit smaller pieces to get under the skirt and be pinched at the next idler.

Conveyor supports too close to the floor line. Impossible to get at or see the return belt to keep it properly trained and be certain that all return idlers are turning freely.

Taking power from tail pulleys. If anything but a small amount of power is taken from a tail pulley it is almost certain to call for a thicker and more expensive belt, which means added cost for every belt renewal. Poor operating economy. If imperative to do this the tail pulley should then always be lagged.

Head shafts too small on conveyors with internal drives. Although carrying no torque the bending stress is greater than on the drive shaft. Rarely smaller than the shaft of a single pulley drive and often ½ in. to 1 in. larger than tandem drive shafts.

(*The end*)

Rock Products News Briefs

Potash Recovery from Wyomingite and Alunite

A DETAILED report on the economics of potash recovered from wyomingite and alunite prepared by J. R. Thoenen has been issued by the Bureau of Mines.

Interest in deposits from which potash might be economically produced in the United States developed during the war when cessation of shipments from Germany, which had furnished the world supply previously, emphasized the importance of a domestic supply.

For the past 15 years the Bureau of Mines has been investigating potash resources through core drilling and has engaged in a comprehensive program of research on the extraction of potash from its various minerals.

This report covers deposits found chiefly in Wyoming and Utah. As a result of the survey it is believed that enough wyomingite is available to supply the United States with its total potash requirements for several hundred years. The economic utilization of these deposits is dependent, however, on large scale mining operations, as the cost of transportation would appear to make small scale operation uneconomical. Alunite deposits of Utah, on the other hand, contain potash sufficient to supply but about one year's requirements for the United States.

The wyomingite occurs in immense lava flows admirably suited for cheap, open quarry exploitation. The marketable products obtained from wyomingite by those processes which the economic analyses indicated could operate on a national scale are:

Potassium acid phosphate, phosphoric acid, aluminum oxide, potassium chloride, potassium sulphate, potassium nitrate, ammonium sulphate and ammonium phosphate. Production of any of these products involves the use of auxiliary raw materials.

The potential markets for aluminum oxide are East St. Louis, Ill., Niagara Falls, and the Pacific Coast. The last two markets are limited and could not absorb the products made if wyomingite were to supply the country's entire potash needs. It is unlikely also that the aluminum markets at East St. Louis could consume the total alumina produced on this scale of operation. The other products are all raw materials for the manufacture of mixed fertilizers. Their principal market is in the Southern United States, involving high freight rates which would be an important factor in competing with foreign materials.

The report contains detailed data on the various products, their markets and available source and cost of raw materials necessary for the manufacturing processes and summary of economic analyses of wyomingite and alunite processes and a discussion of those operations formerly carried on in the districts under consideration.

Fuller's Earth

BUREAU OF MINES statistics for 1932 show 21 plants in 10 states reported production; 11 of these plants in 5 states east of the Mississippi River produced 178,477 tons having a total value of $1,737,643. Contributing to this tonnage, in the order of output, were Georgia, Florida, Illinois, Massachusetts, and Alabama. Ten plants in 5 states (Texas, Utah, Nevada, Colorado, and California) west of the Mississippi River produced 74,425 tons valued at $703,093. Approximately 95% of all fuller's earth produced in the United States during the past 3 years has been used for decolorizing mineral oils, and 5% has been employed in similarly treating vegetable oils and animal fats.

Brick on Concrete Roads

UNDER this title W. G. Sibley, who conducts the column "Along the Highway" in the *Chicago Journal of Commerce*, recently published the following:

"Since Pennsylvania Avenue in Washington was paved with wooden blocks, away back in the 1870's, in the time of Boss Shepard (was it not?), paving block men occasionally take on the ways of Ah Sin in "Plain Words and Truthful James." Recently this remark appeared in this column:

We have seen no public verbal justification for building a concrete road and then covering it with brick. The belief is that the brick are laid solely for the financial profit of the brick manufacturers. Certainly they are an unnecessary expense.

"This casual remark, born of a statement by a gentleman when we expressed wonder at seeing great loads of bricks stacked up on one side of a new concrete road, was caused by surprise when we were told that the brick were to be laid on the concrete in order that the paving block men might get "their share" of profit out of the new highway—a political stratagem, pure and simple.

"It fell under the observation of the National Paving Brick Association at Washington, which regards the remark as 'very damaging to the paving brick industry and not in accordance with the facts.' We cannot concur in this opinion, which we regard as far-fetched, and as innocuous as a bad smell in a windstorm.

"'We are,' says the managing director of the Washington association, 'herewith filing a protest and requesting an explanation.' Very well. What we have said is the explanation. If it does not appear to be in "accordance with the facts," the stretch of brick paving on top of solid concrete is in evidence, where the gentlemen in Washington, who protect the sanctity and purity of the paving brick industry, and are, we trust, well paid for doing so, may start something by an investigation. Certainly we are conscious of no offense in our paragraph, and no purpose to injure the industry concerned, but rather to promote public economy in road building, and stop laying a brick road on top of new concrete roads under any pretext.

"We feel entitled to an apology from the Washington office for assuming to administer a reproof to this column when ignorant of the facts. There is too much of that sort of thing going on in Washington, where fault-finding with the press is prevalent, and interference with its freedom is not unknown."

Ask Rate Revision

SEVERAL sand and gravel rate cases were heard by the Illinois Commerce Commission at Springfield, December 6. First on the docket was application of the Chicago and Illinois Midland railroad and the Alton line to establish a rate of 50c per net ton, plus an emergency charge of 6c on sand from Pekin and Lincoln to Springfield.

Approve Status Quo for Western Cement Rates

EXAMINER J. EDGAR SMITH has recommended to the Interstate Commerce Commission that it dismiss the complaint of the Beaver Portland Cement Co. and other cement plants associated in its petition against the California Central Railroad.

Substance of the complaint, he says, was that transshipment rates from California plants to California ports, being lower than the local rates, subjected Oregon and Washington plants to undue disadvantage. The examiner maintained that the complaint clearly "was not the ordinary undue-preference-and-prejudice case" because there was no suggestion that any of the rates were unreasonable except in their indirect effects.

After comparing rate and price data, Examiner Smith declared that there must be some commercial explanation of a situation in which California cement could be sold in Oregon in competition with Oregon cement when it appeared that the California product, on a delivered basis, would cost more than the Oregon cement. He was quite sure, he said, that the clue to the ability of California cement producers to compete locally with cement produced in Oregon and Washington was not to be found in freight rates.

(*Additional traffic news on Pages* 40-41.)

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Concrete Pipe Code Now in Final Form

FOLLOWING the open hearing November 28 on the code of fair trade practices submitted by the American Concrete Pipe Institute, the necessary changes were made speedily, to encourage immediate official approval.

A minimum wage rate of 37 cents an hour is provided except in the south where 27 cents is bottom. The maximum (30-day period average) weekly hours per employe are 40.

An elaborate voting mechanism is outlined in the code for the functioning of the code authority through nine geographical districts. Each regional vote represents a production, in the preceding calendar year, of 5,000 tons of concrete pipe. Assessments also are provided for on the basis of concrete pipe manufacturers' tonnage figures.

According to R. J. Fogg, deputy assistant administrator for the National Recovery Administration, in charge of the government's negotiations on the concrete pipe code, it is the first code to pass the Consumers' Advisory Board without objection.

Code Seen as Trade Aid for Concrete Masonry

THE CODE of fair competition for producers of cement block, tile or brick building units, signed by President Roosevelt, November 27, and in effect as law since December 11, provides for a 40-hour week. At the suggestion of the National Concrete Masonry Association which submitted the first draft of the code last August, plant employes are allowed to work 48 hours a week (but not more than 8 hours a day) for 15 weeks a year to meet seasonal requirements.

President Benjamin Wilk of the N. C. M. A., while admitting the restrictive nature of labor provisions in the code, believes that the code generally will permit the fair competitive conditions needed by the industry to make it grow.

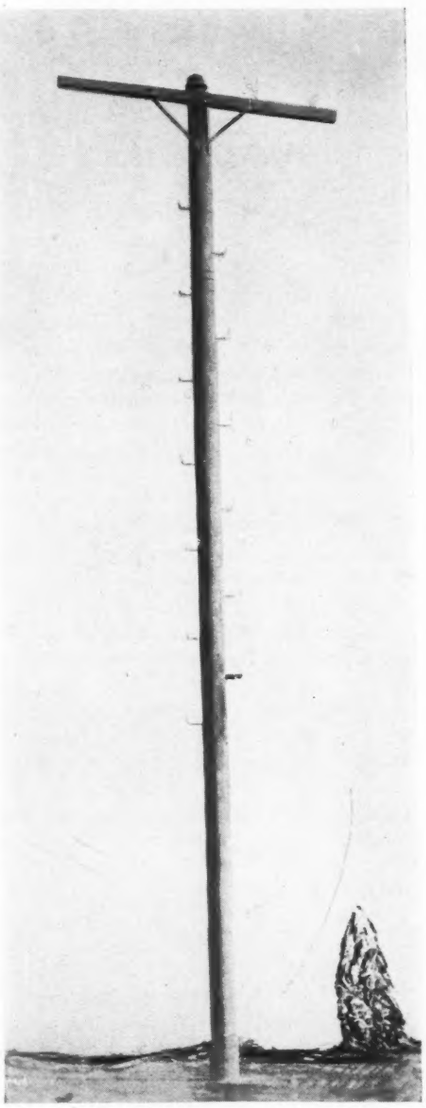
Owners of cement product plants, if they personally perform manual labor or engage in mechanical operations, are subject to the same maximum-hour regulations as employes. Forty cents an hour is the minimum shop labor wage rate, except in 13 southern states where 30 cents is the base. Fifteen dollars is the weekly minimum stipend for clerical help.

No reference is made in the code as to plant capacity increases or new plants opening up.

Code Authority

Five regions are specified to be separately represented in the code authority which also is representative of three plant groups segregated as to capacity ranging from less than 250,000 to more than 500,000 8x8x16-in. units (or equivalent) annually. Regional and subregional committees are to be chosen by "some fair system of election." Many district meetings of concrete products operators will be held during January and February.

Unfair competitive practices which the code authority (including NRA appointees) are ordered to prevent include the usual prohibitions of secret rebates, contract interference, competitor defamation, misbranding, etc., and selling below cost. Open prices are mandatory.



Termite-proof concrete pole

Concrete Poles

REINFORCED, centrifugally spun concrete telephone and telegraph poles have been proved practical in southern California, where wood pole price differentials are more favorable to concrete pole usage than in other sections. The Marbelite Corporation of America, Ltd., Los Angeles, has subjected its poles to gruelling tests and now guarantee them for all applications where other types of poles are used.

The 40-foot pole adapted for use as a telephone or telegraph pole as well as for carrying high tension lines of all kinds measures 13 inches in diameter at the butt, outside dimensions, and 8 inches at the top. The hollow space in the center measures 5 inches at the butt and 3 inches at the top. One-day cement is used with pea gravel aggregates. The reinforcement consists of 13 half-inch iron bars running the full length of the pole spirally wound with 3/16 inch iron wire. The weight is approximately 2,600 lb.; it may run up to 3,100 lb.

In testing the pole to ascertain resistance to lateral stress a pull of 2,500 lb. applied one foot from the top was withstood, it is reported, even though the deflection was 48 inches. A weight of 2,600 lb. caused the pole to fail at a point between the ground line and 10 feet from the butt and between the ground line and 6 feet from the butt.

The poles are made for the use of standard lagscrew steps, cross arms, and gains such as are used with wooden poles. The screw threads for the lags are provided by the manufacturer and it is recommended that if they are to remain permanently that they be dipped in neat cement grout before being screwed into the pole. The cost of setting the poles is practically the same as that of setting wooden poles.

Poles as tall as 70 feet have been tested to the satisfaction of the company, but none of these has yet been sold.

Rock Products News Briefs

Slag

New Use: It was recently found that slag lost overboard from barkes en route through Chesapeake Bay has been widely used by young oysters that very readily attach themselves to it. One of the greatest problems in the raising of oysters is to provide material for the young oysters to attach themselves to while growing to maturity. Investigation of the efficiency and availability of the slag for oyster growing has been ordered by the Maryland conservation department.

◈ ◈ ◈

Sand and Gravel

Churchill Gravel Co., Pontiac, Ill., is in the highway contracting business, having recently been awarded two road-graveling contracts in Livingston county.

◈ ◈ ◈

State Royalties on sand and gravel from the Columbia river in Oregon and Washington were waived by state authorities in favor of the U. S. War Department, so that commercial producers might bid for concrete aggregates for Bonneville dam.

◈ ◈ ◈

Dixie Sand and Gravel Corp., Chattanooga, Tenn., has been made defendant in a rather unique suit. The corporation is charged with maintaining "an attractive nuisance." The action is based on the accidental drowning of a boy, on September 24. The declaration charged that the operation of the Dixie company has caused a peninsula to form of muck and sediment in the river. This point in the river attracted children and the boy was drowned while playing there. The declaration charged that the company also violated the Federal regulations against obstructing navigable streams. There are numerous instances of suits over accidental drowning of children in water-filled quarries and gravel pits, but few if any based on drownings in a navigable stream.

◈ ◈ ◈

Los Angeles Rock Co. has taken a lease on the Walker rock plant south of Baldwin Park, Calif., and has completely overhauled the plant and installed new machinery.

◈ ◈ ◈

Best Rock Co., Monrovia, Calif., has started breaking ground for a new plant located one mile south of Monrovia on the Arrow highway. The plant will have a capacity of 1,000 tons per day and it is expected to be ready for operation some time after the first of the year.

◈ ◈ ◈

Burden Material Co., Compton, Calif., whose plant is located one mile south of Monrovia, Calif., on the south side of Arrow Highway, was recently moved to a new location across on the north side of the highway and is about ready to begin operations. It is one of the most modern and up-to-date plants in the San Gabriel Valley.

◈ ◈ ◈

Rock Phosphate

Mt. Pleasant, Tenn.: The most interesting news that has come out in recent past was given out at a mass meeting and banquet held at Columbia under auspices of the newly organized Chamber of Commerce, at which in addition to Hon. James McCord, Mayor of Lewisburg, the principal speaker was Dr. H. A. Morgan, head of fertilizer operations of the Tennessee Valley Authority.

Dr. Morgan made it plain that the development of the Tennessee Valley was a long-time experiment destined to show the way to proper development of the rest of the country, and its greatest success would be the demonstration of the desirability of properly interrelating industry and agriculture, by disseminating industry throughout agricultural regions, and that in no like area in the world was there so magnificent an opportunity to do this as in the Tennessee Valley, where the greatest wealth of raw materials for industry was most widely disseminated through one of the best potential agricultural areas, accompanied by the enormous power possibilities.

He stressed the phosphate deposits as one of the most important of these raw materials, and gave out most encouraging indications of the final success of the experiments being conducted at Muscle Shoals to make of great value not only the extremely limited remaining tonnage of extra high grade rock, but the vast tonnage of low grade rock throughout this region.

J. W. Young was introduced by Dr. Morgan as the man he had in this section taking lease options on phosphate land for the TVA, who had already secured about 8,000 acres, and expected to get at least 40,000 acres. The royalty prices at which Mr. Young is taking leases vary from 50c per ton for 72% or better to 23c per ton for 45%, the lower limit provided to be taken.

On this basis, an ordinary deposit of brown rock, averaging 3 ft. thick, turning out 3000 tons per acre and grading 65%, will be worth to its owner $1,290 per acre of rock, while an acre of ordinary blue rock, 20 in. thick, which will turn out 5000 tons per acre grading 55%, will be worth $1,650 per acre of rock.

All independent owners of phosphate land frozen assets are earnestly praying for the successful outcome of these experiments and the consequent outpouring of phosphate rock from this section with the corresponding inflow of that which it takes to melt them.

Dr. Morgan admitted the obsolescence of the nitrate plants, but intimated they could be modernized, or made to answer for the purpose of the phosphate experiment referred to, which would point the way for future industrial action. A point not brought out, but one that seems obvious is, that in the development of the Duck River Valley, merely giving water based freight rates to the 200,000,000 tons of phosphate of the grade mentioned, would mean a return to the people, of at least $250,000,000 in freight saved alone, which will more than pay for the entire Valley program, several times over.

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Tampa, Fla.: Phosphate exports in September and October were above any month of the last three years, according to the customs figures, according to the *Wall Street Journal* (New York). The total exports for October amounted to 74,448 tons and September 75,092 tons. Only three times in 1931 did production pass the 60,000 ton mark. Last year the peak was 48,668 tons in March and the figure exceeded 45,000 tons three times in the year. Shipments took a sharp up-turn in August, with a total of 55,642 tons, after an average of around 45,000 for the preceding six months.

The average monthly exports up to November 1 were about 50,000 tons, with a low mark of 24,000 tons shipped in January. Last year's average was 31,500 tons and that of 1931 was 51,500 tons.

Of the 23 cargoes shipped in October this year, eight went to German ports, totaling 24,000 tons; four to Spain, totaling 10,551 tons; and three to Japan, totaling 10,150 tons.

◈ ◈ ◈

Crushed Stone

Watauga Stone Co., Knoxville, Tenn., has taken over the East Tennessee Sand and Gravel Co., Elizabethton, which was formerly owned and operated by the same organization as the Franklin Limestone Co., Nashville, Tenn. The president of the Watauga Stone Co. is Thos. McCroskey, Knoxville, Tenn.

Roofing Granule Code

THE National Recovery Administration held a hearing on the code of fair competition submitted by the Roofing Granule Manufacturers Association, claiming to represent 95% of the industry, December 19. Deputy Administrator Barton W. Murray presided.

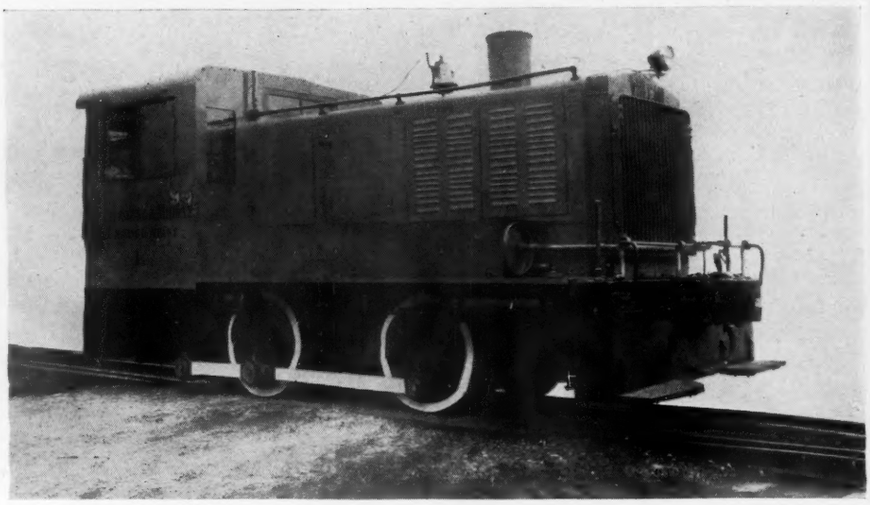
The code would establish an average 40-hour week, an 8-hour day and a 6-day week, with certain extension of working hours allowable to be paid for at the rate of time and one-third of the normal rate.

Minimum rate of 35c an hour would prevail in the northern section of the country, with a rate of 30c an hour in the southern states, for general employes.

New Machinery and Equipment

Quarry Locomotives

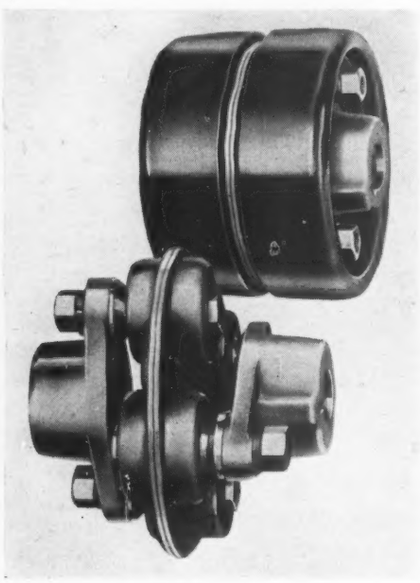
A FEATURE of the 35-ton, 224 hp. gasoline locomotive developed for quarry work by the Vulcan Iron Works, is its air-operated clutch and clutch-and-gear-shift interlock. This arrangement is said to prevent any damage to transmission or speed change gears as the operator is required to fully disengage the clutch with each gear shift. The clutch will not engage unless the speed change is fully completed. This unit is designed to operate over rails rated as light as 60 lb. and can turn on a 40-ft. radius curve "practicably." The service weight of this heavy duty locomotive is 70,000 lb. and its manufacturers claim that in an ordinary eight-hour day it will consume approximately 35 gal. of fuel.



Gasoline geared locomotive

Coupling

A SPECIALLY DEVELOPED rubber is used as the flexing medium in the new flexible coupling recently introduced by the Morse Chain Co., division of Borg-Warner Corp. The flexing member is a complete unit comprising four moulded rubber trunnion blocks, of patented design, spaced 90 deg. apart, and set under pressure into a two-piece riveted steel housing. The blocks are provided with steel cores or bushings also set under pressure.



Flexible coupling

There is no metal contact between the flanges, the only contact between the two shafts being through the flexible rubber bushings or blocks. The company claims there is no movement between rubber and metal, all flexing being entirely within the rubber. The result, say the engineers who designed it, is a "rugged, noiseless coupling which has a maximum of flexibility; accurate laboratory tests show that it will operate without power loss even with maximum misalignment."

Screening Specialties

HERRMANN screening units now are being manufactured by the Abbé Engineering Co., Inc., which has the United States rights on production and merchandising. For cement work, quarries and sand and gravel operations in particular, the company recommends the Herrmann "Streno" screens developed for sieve operations characterized by heavy strains.

The Herrmann line of screens is extensive, with a type suitable, says its manufacturer, for all major industrial applications. At the present time the company is giving special attention to the exact technical requirements of the sand and gravel and rock products industries in general.

Abrasion Alloy

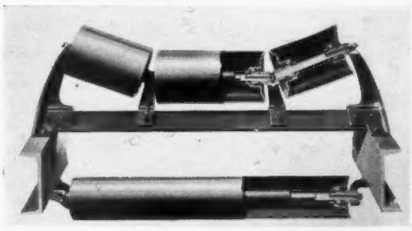
A NEW ENTRY is announced in the field of abrasion-resisting cast-iron alloys. The Robins Conveying Belt Co. has brought out "Super Manga Iron" which it claims is suited to applications including mill balls, grizzly bars, chutes and liners, crusher rolls, grizzly discs and grinding mills.

Wear tests with this new iron indicate, says the company, two to twelve times longer life than plain chilled iron in numerous applications. An instance of this is given in respect to cement mill liners which lasted 4,000 hours when the new alloy was used compared with 700 hours when plain chilled iron liners were used.

The structure of the alloy is defined in part as follows: "Martensitic with a refined carbide network which contributes to its uniformly higher hardness, strength and toughness." Its chilled surface, according to the announcement, will show a Brinell hardness of 600-750 or 150 to 250 numbers higher than plain chilled cast iron.

Belt Idler

REDUCTION OF BELT WEAR and suitability for the heavy duty application found in the rock products industries were problems considered by the designers of the Jeffrey "Reliance" troughing idler. These troughing idlers are of the three-roll type with end pulleys inclined 20 degrees. In addition to having individual roll edges rounded, distance between rolls has been reduced to from 5/16 to ⅜-in., thus preventing belt creasing. Lubrication and bearing provisions are modern throughout.



Three-roll troughing idler

Welding Cast Iron

AN ELECTRODE for welding cast iron by the shielded arc process is announced by the Lincoln Electric Co. The electrode, known as "Ferroweld," has a steel core surrounded by a heavy flux coating

which protects the arc from gases injurious to the weld which are present in the atmosphere. One of the advantages claimed for "Ferroweld" is the low heat with which it can be used, thus reducing the possibility of cracking.

The electrode is manufactured in only one size, ⅛-in., and is used with approximately 80 amperes of current.

Welding is done intermittently, not over a 3-in. bead being laid down at one time. As each bead is welded it is peened lightly, thoroughly cleaned and allowed to cool somewhat before the next bead is deposited. Due to the low current with which it is used the hardening effect ordinarily present along the line of fusion is materially reduced, says the company, thus making for a "more machinable" weld.

Welder on Trailer

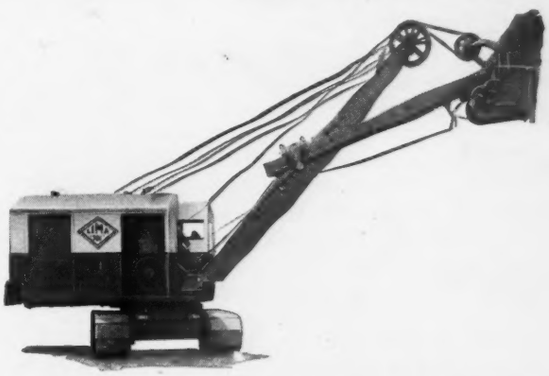
ARC WELDERS utilizing the shunt inductor principle of arc stabilization in motor-generator and gasoline engine driven models now are available on four-wheel portable trailer mountings as well as on the older two-wheel trailer type. The Universal Power Corp. provides its welding unit trailers with balloon tires and a rigid steel chassis in order to give the operator good "roadability." An idling control device, claimed to be instantly responsive to the touch of the operator, permits the engine to run slowly when not welding, thereby effecting all-around economy. When ready to weld the operator, at his electrode holder, brings the equipment again to automatically governed speed, and proceeds with his work.

Combination Unit

BY A QUICK CHANGE of front-end equipment one of the newer 1¾-yd. shovel, dragline and crane combination units may be easily converted into various combinations to serve different operations. This new machine, brought out as Type 701 by the Ohio Power Shovel Co. in December, is powered by a six-cylinder gasoline engine with provision made, however, for installing Diesel or electric power units when desired.

Four-wheel trailer mounting for welder

"Special attention," says the company, "has been given to the selection of materials. Special steels have been used. Noisy spur gears have been discarded for the quiet helical cut type."



Shovel, dragline and crane unit. Crawler truck is equipped for roller extensions to be used as field work requires

Other advantages claimed for this unit include square lever shaft to eliminate keys; large diameter drums; and sliding shaft members to eliminate backlash. It is possible with this unit, says the company, to hoist, travel, swing, steer, raise or lower the boom simultaneously. The boom and dipper handle are of box type construction, and the manganese dipper is cast in one piece with detachable lip. The crawler truck is provided with roller extensions for field work.

Concrete hoist truck with spout

Equipment for the Ready-Mixed Concrete Plant

THE "JACKASS" hoist, developed some time ago, and finding many current applications, is a hydraulic unit designed for mixing trucks and fitted to the rear end of the chassis. The hoist raises the discharge end of the drum to a height of approximately 8 ft. above the ground and from this height the concrete can be chuted over an area, says the Chain Belt Co., approximately 75% greater than with ordinary truck mixers.

Sidewalks thus can be poured across parkways without wheeling, and building foundations and walls can be chuted even when the truck cannot get within 10 to 20 ft. of the hole.

Another accessory development is the one-man spout. When the mixer is traveling, the chute rides beside the drum replacing one fender. When on the job, one man swings it out of its cradle and into position, hooks the supporting rod, and is ready to pour.

Rock Products News Briefs

Cement

Santa Cruz Portland Cement Co., Davenport, Calif., is installing one of the most unusual cement handling plants in the industry. On account of the shallow ocean bottom off Davenport it will be necessary for the ships to lie 2000 to 2500 ft. offshore. The plant silos are about 1000 ft. from shore line. Cement will be pumped the entire distance at the rate of 2000 bbl. an hour by Fuller-Kinyon pumps. The ships will be unloaded and the cement handled to storage silos at various ocean and river ports by the same methods.

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Calaveras Cement Co., San Andreas, Calif., has been awarded a contract for 440,000 bbl. for the San Francisco Bay bridge.

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Lone Star Cement Co., Kansas, subsidiary of the International Cement Corp., New York City, has started making "Incor" rapid-hardening portland cement at its Bonner Springs plant.

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George T. Cameron, president of the Santa Cruz Portland Cement Co., San Francisco, Calif., has resigned his office as director of the Golden Gate bridge and highway district as a result of the controversy over the type of cement to be used in the south pier and fender concrete. The controversy has been particularly acrimonious and personal because Mr. Cameron is also the publisher of the *San Francisco Chronicle,* and the competing Hearst newspaper, the *Examiner,* has taken particular delight, after the good old-fashioned methods of newspaper rivalry, in riding him. In his letter of resignation, Mr. Cameron said:

"In 1932, in competitive bidding, the Pacific Bridge Co. secured a contract from the district for the construction of the Marin pier and the San Francisco pier and fender of the bridge. In the specifications constituting a part of the contract provision was made for the furnishing of concrete from standard portland cement, or any other hydraulic cement approved by the engineer, at the option of the district, and it was furthermore therein provided that all specifications (including those above) were subject to change or alteration by the engineer.

"Pacific Bridge Co. contracted with Pacific Coast Aggregates, Inc., to furnish the required concrete, and the latter in turn made a contract with the Pacific Portland Cement Co. whereby that company was to furnish its standard portland cement.

"After the Pacific Bridge Co. had completed the Marin pier and was about to commence construction of the San Francisco pier and fender, the engineers of the district, after full investigation, determined and unanimously reported to the directors of the District that a high silica cement, which is a hydraulic cement, would be more suitable for use in that construction than standard portland cement, for the reason that concrete containing a high silica cement would better resist the corroding effect of ocean water, in which the San Francisco pier and fender will be submerged during the life of the bridge.

"The directors of the District concurred in the conclusion reached by the engineers and directed the Pacific Bridge Co. to use the high silica cement in the construction of the San Francisco pier and fender.

"The Santa Cruz Portland Cement Co., of which I am a stockholder and the president, has manufactured high silica cement for several years. The Pacific Portland Cement Co. does not manufacture and never has manufactured high silica cement.

"Hence the Pacific Coast Aggregates, Inc., took steps to secure from the Santa Cruz Portland Cement Co. the high silica cement required by the engineers' detailed specifications.

"Although I did not participate in or vote upon the determination of the District to use the high silica cement, the Pacific Portland Cement Co. has brought suit against the District, its directors and others, to prevent the use of high silica cement and to compel the use of its cement, upon the bare ground that I am a director of the District.

"The District has been advised by its counsel that the proceedings to secure the use of the high silica cement are valid, notwithstanding I was a member of the board of directors of the District at the time.

"The litigation thus started by the Pacific Portland Cement Co. may, however, delay the work on the bridge, which it is most important to avoid. I cannot permit my continued membership on the board to contribute even by possibility to that delay.

"I have in consequence resigned."

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Universal Atlas Cement Co. has a Silver Medal Club, composed of employes who have seen 25 years of service with the company. Recently the club at the Hudson, N. Y., plant had an anniversary dinner.

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Pacific Portland Cement Co. has issued "a challenge" to the Golden Gate bridge and highway district to justify its selection of high silica ("pink") cement for underwater work on the bridge piers by publishing the results of its testing laboratory tests. Claims are made that tests by three public testing laboratories, Raymond G. Strong, Los Angeles; Robert W. Hunt Co., San Francisco, and Abbott A. Hanks, Inc., San Francisco, show unsound pats.

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Statistics of the U. S. Bureau of Mines show the portland cement industry in November, 1933, produced 4,672,000 bbl., shipped 4,463,000 bbl. from the mills, and had in stock at the end of the month 19,711,000 bbl. Production of portland cement in November, 1933, showed a decrease of 27.7% and shipments a decrease of 6.7%, as compared with November, 1932. Portland cement stocks at mills were 4.9% higher than a year ago. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 163 plants at the close of November, 1933, and of 165 plants at the close of November, 1932.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

	November 1932	1933	Oct. 1933	Sept. 1933	Aug. 1933
The month	29.1	21.2	22.1	25.5	35.9
The 12 mo. ended	29.0	23.9	24.5	25.5	26.5

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Crushed Stone

New York State cannot sell crushed stone from a state-owned quarry to a contractor engaged on a state contract, Attorney General John J. Bennett ruled recently in the case of a Great Meadow prison contractor. Mr. Bennett held that such action would put prison labor in direct competition with free labor, to the detriment of the latter. The opinion of the attorney general was asked by Thomas F. Farrell, chief engineer of the state public works department. Quarries operated by county jails are not affected, however, if the stone is used by county labor and not sold.

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Agricultural limestone will be available to farmers of Rock county, Wisconsin, at prices ranging from 70 to 90c per ton, the county board decided in its first attempt at price-fixing. It accepted a report of a special committee appointed a week ago to confer with owners of private crushing outfits. A maximum of 5c per ton to the owner of limestone quarries will be allowed. If the prices agreed upon are met, the county will stay out of the crushing business, the report indicated, and will leave the field to private operators. The local "code" was agreed upon after the board last September voted to crush limestone under the direct supervision of the highway and agricultural committee of the board. Owners of private crushing outfits appeared to protest that they were put out of business by the county activities.

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Lime Products Manufacturing Co., Dallas, Ore., has been organized by Klebe & Watts to operate under contract the quarry and plant of the Oregon Lime Products Co. near Falls City. New machinery for crushing and pulverizing limestone is being installed. The plant was previously operated for a season by the March Construction Co., Spokane. The renovated plant will be powered by electricity. A power shovel will be installed.

THE INDUSTRY

New Incorporations

Concrete Products Mfg. Co., Brentwood, Mo., incorporated with $40,000. Ray McManemin is the incorporator.

Miami Stone Co., Toledo, Ohio. 1,000 shares no par value. C. V. Wolfe, R. H. Rogers and A. C. Ehrenfried are the incorporators.

American Cement Corp., Hartford, Conn., with a capitalization of $50,000; par $100. Incorporators are Harry Levine, Jacob Lifset and Charles J. Sheketoff.

Waterside Concrete Works, Inc., New York, N. Y., to deal in concrete and cement products. Filed by Max Lange, 136 Liberty street. 200 shares no par value.

Emil E. Wolf, Morse Bluffs, Neb., organized a new sand and gravel company with a capital of $25,000. Other incorporators are Mrs. Stella Wolf and Adrian Wolf.

Macon County Limerock Co., Montezuma. Macon County, Ga., to deal in limerock for road building purposes, with a capitalization of $25,000. Incorporators are J. B. Easterlin, Jr., C. H. Wheatley and O. T. Harden.

Dealers Lime Corp., Manhattan, N. Y., to deal in lime and limestone products. Filed by A. A. Silberberg, 285 Madison Avenue, New York, N. Y. 100 shares no par value.

Personals

Lawrence M. Sager, salesman for the Ohio Blue Limestone Co., Marion, Ohio, has been named service and safety director of the city of Marion.

Fred Andrews and H. H. Phillips have been appointed general manager and sales manager, respectively, of the Gypsum, Lime and Alabastine Co.

Joseph Brobston, vice president of the Hercules Cement Corp., Nazareth, Penn., recently addressed an industrial management session at the Lehigh University.

L. W. Shuff, of the General Electric Co., Schenectady, N. Y., has been elected as vice president and director of the Exhibitors Committee Industrial and Power Shows, Inc., for 1934.

F. W. Young, formerly with Filtration Engineers, Inc., and more recently with the Pulp Filter Co., has joined the sales organization of Oliver United Filters, Inc., New York, Chicago, San Francisco.

Frank M. Traynor, vice president and general manager of the Florida Cement Co., and president of the Tampa Chamber of Commerce, is a vice president in the newly organized Southern Brewing Co.

Rulon C. McMurrin, vice president of the Los Angeles Rock and Gravel Co., Los Angeles, Calif., reported to police November 28 that he had received a crudely penciled extortion note demanding $25,000 in return for the continued safety of his family. His household, including two small children, has been placed under police guard.

J. P. Hoskins, president of the First National Bank of Chattanooga, Tenn. until his resignation the last of November, has been appointed secretary of the Signal Mountain Portland Cement Co. to fill the vacancy caused by the resignation of R. R. Caskey. Mr. Hoskins has been treasurer of the cement concern since its organization. Under the new arrangement the offices of secretary and treasurer are being combined. John L. Senior, Chicago, is president of the company but the local management will be in the hands of Mr. Hoskins.

Obituaries

George Watling, 49, president of the Watling Sand and Gravel Co., Seattle, Wash., died November 17.

Samuel Burridge, 52, died November 17 at Red Wing, Minn. He was a partner in the Maiden Rock Sand Co.

Everett B. Irwin, 38, died November 30 at Toledo, Ohio. He was secretary of the Woodville Lime Products Co.

Thomas Anderson Courtenay, 83, sales manager of the Louisville Cement Co., died November 27 in Louisville, Ky.

William Robert Berry, 69, for more than 20 years secretary and treasurer of the Santa Cruz Portland Cement Co., died at his home in San Francisco, Calif., December 3.

Charles C. Kritzer, president and founder of the Kritzer Co. and inventor and builder of the Kritzer lime hydrator, died recently at his home in Chicago, aged 72 years.

Jacob T. Raleigh, 69, former Utah legislator and president of the Santa Clara Sand and Gravel Co., Montalvo, Calif., died in Santa Barbara, November 8. Funeral services were held in Salt Lake City, Utah, his old home.

Clifford F. Messinger, 44, president of the Chain Belt Co., Milwaukee, Wis., died December 12 of a sudden heart attack. He entered the service of his company as a college apprentice in 1911 after graduating from Yale University and became successively advertising manager, sales manager, general manager, vice president and president.

C. D. Smith, 69, operator of gravel pits in Memphis and the south, died December 13 at Memphis after a ten-day illness. Noted for accomplishments in the contracting field, Mr. Smith's firm built the Santa Fe line across the Mojave Desert and more than 1,000 miles of railway trackage in Mississippi. He and his associates built a section of the New York City subway. He was head of the Memphis Gravel Co.

Cement

Keystone Cement Co., Bath, Penn., recently resumed operations.

North American Cement Corp. plant near Hagerstown, Md., will reopen January 1, taking back 300 employes.

Pennsylvania-Dixie Cement Corp. will resume operations at its plant in Kingsport, Tenn., on or about January 1.

Hawkeye Portland Cement Co. recently resumed operations in its rock quarry near Earlham, Ia., with a force of 41 men.

Lehigh Portland Cement Co. plant at Metaline Falls, Wash., has been rescheduled for winter operation with a force of 85 men.

Edison Portland Cement Co. plant at New Village and its quarry at Oxford, N. J., recently resumed operation with 400 workers.

Universal Atlas Cement Co. plant, Independence, Kan., recently closed for 30 days in order to permit repair work, has reopened on its winter schedule.

Spokane Portland Cement Co., Spokane, Wash., has reopened its plant and rock quarry with an additional force being employed to conform to N.R.A. cement code requirements.

Universal Atlas Cement Co. Ilasco plant, near Hannibal, Mo., has been closed temporarily for repairs. Operations will be resumed not later than February 1, according to present plans.

Santa Cruz Portland Cement Co. plant, Davenport, Calif., in December had finishing touches put to its latest group of cement storage units and work is being pushed on its 2,600-ft. steel wharf adjoining the plant. From the plants of this company will come much of the cement to be used on Federal projects now under way or planned for the Pacific Coast to involve the expenditure of approximately $186,000,000.

Quarries

Two quarries are to be opened near McConnelsville, Ohio, for relief work.

Two county quarries near Grindstone and Fairport, Mo., are to be opened.

Rock quarry near Pleasanton, Kan., has been in capacity operation for several weeks.

Coffeyville, Kan., has purchased a rock crusher, to be used on local relief work, for $1,500.

A rock quarry near Seaman, Ohio, has opened in connection with a local C.W.A. project.

Seven rock quarries near Marietta, Ohio, are to be reopened in connection with C.W.A. projects.

Two Lee county, Ia., quarries near Fort Madison will be put in operation for local road projects.

A new quarry producing about six cars of riprap stone daily has been opened at Nehawka, Neb.

Community rock quarry north of Herculaneum, Mo., is employing 90 men in three eight-hour shifts.

Floyd quarry equipment is being moved from Floyd to Cedar Rapids, Ia., for the M. O. Weaver Co.

Smith rock quarry, north of Ormond, Fla., has been reopened in connection with a local C.W.A. project.

Rock crushing equipment near Chilhowee, Mo., has been put in operation for relief work by local authorities.

Rock crushing machinery has been installed at Iron Mountain, Mich., by Wilson Bell to crush refuse stone.

Municipal quarry at Riverside, Calif., has reopened on a production program calling for 400 tons of rock per day.

Penry Stone Co. near Radnor, Ohio, has been awarded a contract for 3,000 tons of stone for a local Civil Works Administration project.

Little Danger rock quarry, Little Rock, Ark., reopened recently with 60 men under the management of G. B. Sparks, former postmaster.

County authorities at Grant City, Mo., report that the state highway department is considering opening two rock crushing plants near Grant City.

County authorities in Breckenridge, Mo., are preparing to lease a private quarry and rock crushing plant in order to put local unemployed men to work.

Relief work in Daviess County, Mo., involves the winter operation of three rock crushing plants, one at Gallatin, one at Pattonsburg and another at Jamesport.

Preparatory to opening a second county rock quarry and rock crushing plant, rock deposits are being stripped along the Chiquaqua river south of Peoria near Oskaloosa, Ia.

Three rock quarries near Davenport, Ia., one in Buffalo township, another in Princeton and the third in Butler township are scheduled for reopening in connection with local highway projects.

Rock from Sturgeon Bay quarries, Sturgeon Bay, Wis., will be used for breakwater construction at Indiana Harbor and at Port Washington. Contracts call for approximately 430,000 tons of stone.

Lowerre rock crushing plant leased by the city and township of Pleasant Hill, Mo., to George H. Lowerre was in readiness for operation December 1. A second rock crushing machine may be installed later.

Van Buren County Stone Co., Elba, Ark., headed by J. V. Ormand and associates, has obtained a contract for 700 carloads of stone to be shipped to Helena for use on the Federal government levee and revetment work on the Mississippi river. Stone will be loaded at the quarry near Elba and at Leslie.

Sunnyside Stone Quarry crushing plant was damaged to the extent of $50,000, November 16, after a short circuit started a fire on its property at Windsor Farms near Richmond, Va. The stone crushing plant was completely destroyed along with its machinery. Cement had been stored in the same building.

Sand and Gravel

S and G Gravel Co., Marion, Ind., has opened a gravel pit north of Warrington.

Falcon Coal and Gravel Co., Mayville, N. Y., has been purchased by county supervisors.

Sand from the municipal pit of St. Marys, Kan., is being used on extensive resurfacing projects near that city.

Gravel property south of Red Oak, Ia., has been equipped with a new crushing and screening plant. Fifty men now are employed.

Industrial Minerals Co. plant near New Lexington, Ohio, headquarters for the production of moulding sand, burned November 17, with the loss estimated at $100,000.

Mirabel Gravel Co. is enlarging its plant on the Russian river at Mirabel park, near Healdsburg, Calif. New screening equipment has been bought and new bunkers are being built.

Sand Products Corp., Muskegon, Mich., has furnished more than 550,000 tons of sand required to convert old docks and slips into a site suitable for modern terminal developments.

Forest Gravel Co., Inc., Alexandria, La., has filed notice of dissolution.

American Graded Sand Co., Chicago, Ill., is constructing a $5,000 warehouse addition.

Industrial Mineral Sales Co., Pittsburg, Calif., has been sold to Hazel-Atlas Glass Co. by R. M. Greathouse.

Missouri River Sand and Gravel Co., Boonville, Mo., will build another sand barge, to complete its fleet, this winter.

Municipal gravel crushing plant, Trinidad, Colo., has resumed operations to furnish material for local street projects.

Island Sand and Gravel Co. plant and equipment at Friday Harbor, Wash., has been bought by C. B. Morrow, Seattle.

Lime

Speed Lime and Stone Co., Milltown, Ind., recently hired 40 additional men.

Lime rock crushing equipment has been set up near Prairie Du Sac, Wis., by Edward Cramer of Plain.

Oregon Lime Products Co. plant, northeast of Falls City, Ore., is being modernized. New machinery for crushing has been installed.

Fort Towson Lime and Chemical Co., Fort Towson, Okla., has reopened its plant on a capacity schedule, according to T. E. Hopson, manager.

Cement Products

Sewer system rebuilding at Sanford, Fla., to cost $85,000, calls for approximately 20,000 ft. of concrete pipe.

Simons Mayrant Co., Charleston, S. C., plans to establish a cement products plant for the manufacture of concrete block in Greenville, Miss. The blocks will be used for revetment work on the Mississippi river.

Miscellaneous

A new asphalt mine is being opened up in Little River township near Lenoir, N. C.

Brown and Root, Cline, Tex., are employing 150 men in their mine and crushing plant.

Dougherty Asphalt mine near Ardmore, Okla., now is operating with $10,000 worth of new equipment.

F. M. Bresee, operator of phosphate mine at Cokeville, Ida., announces that he will probably open up another property at Montpelier.

Manufacturers

Canadian Industries, Ltd., Montreal, Que., Canada, has announced a new reduction of 25c per 100 lb. in price of all types of its high explosives.

Joseph T. Ryerson and Son, Inc., Chicago, Ill., announce that an extensive addition is underway to their St. Louis steel service plant. Warehouses and air conditioned offices with cooling systems are being built. A circulating warm air heating system is being provided for the proper storing of sheets, tool steels, welding rods, cold rolled bars, bands, etc. The new heated area will be almost three times larger than the present heated plant.

Haver and Boecker, Oelde (Westphalia), Germany, manufacturers of Niagara vibratory screens for the European trade announce that in January one of the largest screens ever built will be put in service at the Westphalia lime works with an expected capacity of more than 300 tons of limestone per hour. This screen will be required for limestone as large as 8 cu. ft. per piece with the ultimate capacity required going up to 600 tons per hour. The mesh for this screen is 6 in. For the Rhenish limeworks, another screen is being prepared measuring 5 ft. 5 in. wide and 12 ft. long, acting as a companion screen for another unit 5 ft. 5 in. wide by 15 ft. long. The latter is expected to give about 500 tons per hour capacity. The open mesh on these screens is 5 in. sq, and the rods have a diameter of 1½ in. The cloth, say the manufacturers, is made of a high manganese alloy steel giving the necessarily high resistance against abrasion. The 1½ in. rods are shaped on heavy presses and mechanically woven. The company claims to have the heaviest weaving machines ever built.

Joseph T. Ryerson and Son, Inc., Chicago, Ill., announces the purchase of stock and good will of Bacon and Co., iron and steel concern of Boston, Mass.

Chain Belt Co., Milwaukee, Wis., has appointed Dale and Rankin, Inc., Newark, N. J., as distributors for its line of Rex construction equipment.

Gas Powered Industrial Truck Association, New York, N. Y., has been organized with E. W. Clark, president; L. J. Kline, general manager; and John A. Cronin, secretary-treasurer.

Morse Chain Co., Ithaca, N. Y., and Detroit, Mich., a division of Borg-Warner Corp., has acquired the right to Kelpo freewheeling or one-way industrial clutch made in Rockford, Ill.

Louis Allis Co., Milwaukee, Wis., announces appointment of Charles F. Norton, formerly vice president and general manager of the Howell Electric Motors Co. as their general sales manager.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., through its board of directors has elected Winthrop W. Aldrich, president of the Chase National Bank, New York, N. Y., as a director.

Kron Co., Bridgeport, Conn., has appointed the following scale distributors: Ebbert and Kirkman Co., Inc., Birmingham, Ala.; William N. Schwab, Los Angeles, Calif.; and Coe-Mantes Scale Co., San Francisco, Calif.

Universal Power Corp., Cleveland, Ohio, has appointed F. R. Faulk as district sales representative in Pittsburgh. The company also announces that the Welding Equipment and Supply Co., Detroit, Mich., has been appointed as distributor for Universal arc welders, accessories and electrodes.

American Cyanamid Co., New York, N. Y., has acquired the General Explosives Corp., manufacturer of blasting caps and dynamite with offices and plant at Latrobe, Penn. The newly purchased concern will be a division of the American Cyanamid and Chemical Co., an operating subsidiary of American Cyanamid Co.

Goodyear Tire and Rubber Co., Akron, Ohio, sponsored its 18th radio broadcast November 27, over Station WADC, Akron, Ohio, on the subject of plant safety. Clifton C. Slusser, factory manager, substituted for President P. W. Litchfield. Tracing progress of Goodyear plant safety work, he said the company records show that only 15% of all accidents are due to machines or equipment failing and the remaining 85% due to carelessness on the part of workers.

General Electric Co., Schenectady, N. Y., announces an improved line of pressure governors designated as type CR 2922 designed for application in industrial processes where it is desired to maintain a predetermined pressure. The scale of these new governors can be furnished to read water heads in feet instead of the usual pounds per square inch. Adjustments say the company, can be made between limits of 20 to 80% of the full scale rating.

Northern Blower Co., Cleveland, Ohio, reports completion of its installation of dust collecting equipment for the Huron Portland Cement Co., Oswego, N. Y. The next major installation of such equipment by this company in the cement field is for the kiln room and clinker handling plant of the San Antonio Portland Cement Co., San Antonio, Texas.

Caterpillar Tractor Co., Peoria, Ill., announces through its president, B. C. Heacock, that George L. Bell, formerly vice president in charge of sales, has resigned to become code administrator for the men's clothing manufacturing industry. H. P. Mee, at present vice president and treasurer of Caterpillar Tractor Co., will be in charge of sales and H. M. Hale, assistant treasurer, will take over the present duties of Mr. Mee.

General Electric Co., Schenectady, N. Y., through President Gerard Swope, recently stated, that more than $10,000,000 had been paid to employes and families of employes of the General Electric Co. in death and disability benefits under group life insurance provisions. A total of 4,360 families and more than 600 permanently disabled employes have been the beneficiaries. The average payment has been more than $2,000 since group insurance policies first were put in effect by General Electric Co. in 1920. At present approximately 47,000 employes are insured under these policies which afford a total production of $140,000,000. Of this sum, $60,000,000 is a group policy paid for by the company and $80,000,000 is represented by additional insurance paid for by employes. Total payments to-date of $10,000,000, says the company, have been almost equally divided between the group policy and the insurance policies paid for by workers.

Trade Literature

Filters. Incidental mention made in 4-page folder of cement plant installation. FILTRATION ENGINEERS, INC., Newark, N. J.

Dust Collector. Broadside gives complete illustrations and descriptions of all metal dust collector. Includes maintenance instructions. PANGBORN CORP., Hagerstown, Md.

Indicator. Double-seated type of indicator valve for Diesel engines illustrated and briefly described in small leaflet. BACHARACH INDUSTRIAL INSTRUMENT CO., Pittsburgh, Penn.

Motors. 24-page illustrated leaflet contains company news of its motor development and various applications interspersed with many non-technical short subjects. THE LOUIS ALLIS CO., Milwaukee, Wis.

Grinding. Ball and pebble mill, pulverizers, rod mills, tube mills, classifiers, rotary tubular conveyors, stone screens, etc., described and illustrated in 4-page folder. HARDINGE COMPANY, INC., York, Penn.

Cranes. Unusual 2-ply circular chart illustrates the all-purpose tractor unit with dragline attachments, etc., separately and consecutively shown. THE BROWNING CRANE AND SHOVEL CO., Cleveland, Ohio.

Couplings. New illustrated catalog shows three different types of flexible shaft couplings tabulated as to specifications and prices. Revolving and stationary types of automatic-lubricating casings described. LINK-BELT CO., Indianapolis, Ind.

Motors. Bulletin 270 illustrates two types of designed motors and speed reducers. Type "Z" is the standard horizontal type motor. Type "LU" is a single reduction unit. Many illustrations and full specifications. THE FALK CORP., Milwaukee, Wis.

Filters. 12-page leaflet and folder describes general water filtration processes and contains specifications on various filter units. Folder supplements detailed water tank installation. GRAVER TANK AND MANUFACTURING CORP., East Chicago, Ind.

Drill Steel. Steel products including several types of drills for rock and a full line of steel accessories such as tamping tools, spades, bars and sledges fully illustrated and described in small booklet. PARAGON STEEL AND TOOL CO., East Rutherford, N. J.

Compressors. Eight page illustrated folder L-611-S6B outlines general design and advantages claimed for single horizontal and single stage steam and motor driven, 7 in. and 9 in. stroke compressors. WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

General. Rotary cement kilns, jaw crushers, gyratory crushers, rolls, grizzley feeders, ball, rod and tube mills, shown in house organ style with some non-technical text in latest issue of "Traylorian." TRAYLOR ENGINEERING AND MANUFACTURING CO., Allentown, Penn.

Loader. Hydraulically operated front end loader for tractor unit illustrated and described in loose leaf page insert. Equipment designed to handle all kinds of bulk material including sand and gravel. EUCLID-ARMINGTON ROAD MACHINERY CO., Cleveland, Ohio.

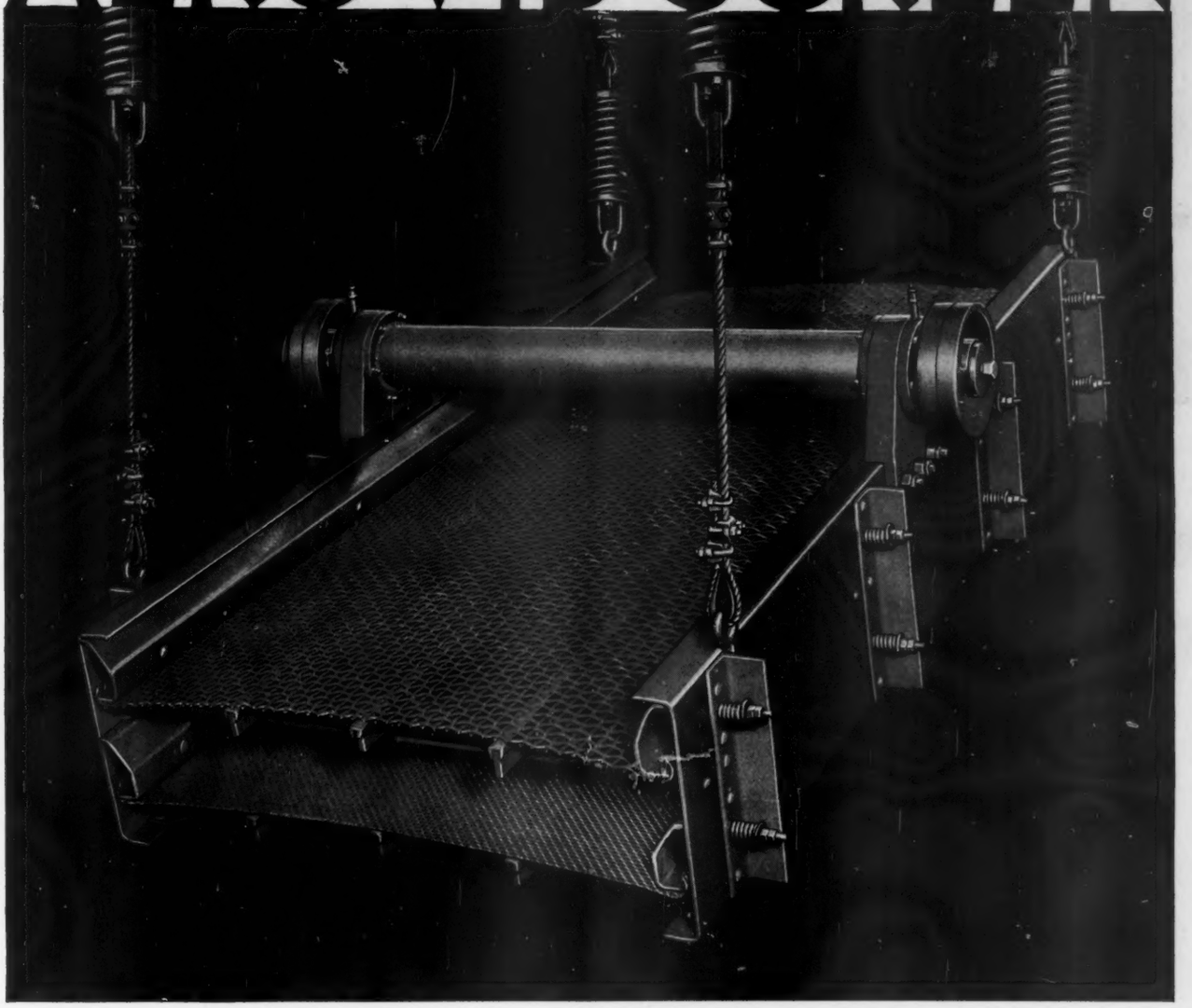
Motors. Leaflet 20584 describes a new complete line of splash and drip proof motors with control for varying requirements. Units recommended especially for sand and gravel plants and wet grinding processes. WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Penn.

Compressors. Bulletins W-850-B32 to W-850-B37, inclusive, describes portable air compressors ranging in capacity from 120 cu. ft. per min. to 360 cu. ft. per min. Eight pages in each leaflet. WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Pumps. Bulletin 150 describes double-suction high-speed pumps of centrifugal type. Design and construction problems outlined as purpose to exposition of mechanical details, sectional views and performance charts given. Information on steam and motor units. MORRIS MACHINE WORKS, Baldwinsville, N. Y.

Motors. High speed synchronous motor data on "type G" condensed into illustrated 4-page folder. Text describes these units with thermoguard protection and recommends them for constant speed application such as fans, blowers, compressors, pumps, Jordans, beaters, etc. Leaflet 20537. WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Penn.

AERO-VIB SCREEN



A Light Weight . . . Rugged . . Low Cost Vibrating Screen

The Aero-Vib screen is suspended by cables and springs, confining all vibration to the body and material on the decks. It has a rapid intense screening action, the amplitude of which is adjustable to fit screening conditions. The screen cloth is held in tension in the body and easily changed. The screen is of simple rugged construction. The vibrating mechanism has only two bearings and is a self-contained unit located conveniently above the body. Aero-Vib screens are supplied with Texrope drives and totally enclosed, dust and moisture proof, anti-friction bearing motors. ***Bulletin 1474.***

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Allis-Chalmers Manufacturing Company, Milwaukee

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An all-feature crusher of exceptional strength and ruggedness—designed for efficient, economical operation under the most exacting service conditions.

The patented pitman is so designed that it eliminates power-wasting friction. An exclusive, patented safety device that guards the crusher against breakage. Many other features that make this crusher a prime favorite for crushing every known variety of rock and ore.

The most efficient, accessible and reliable Jaw Crusher.

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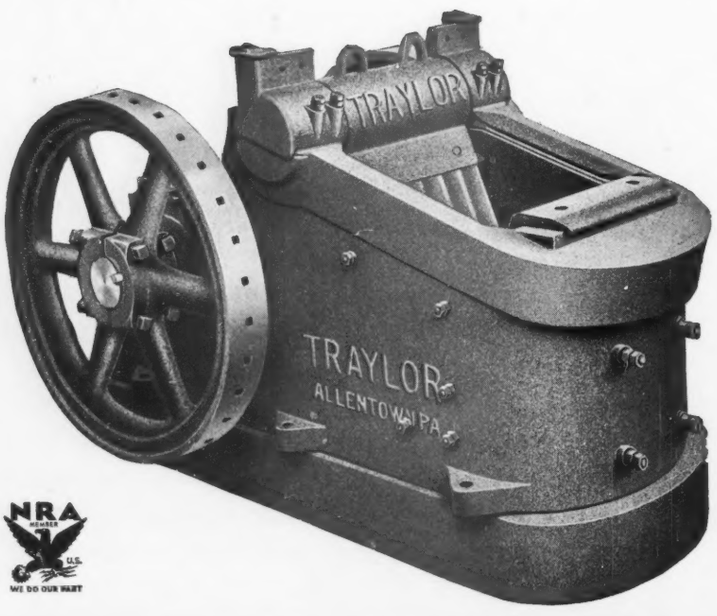

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Link-Belt Sand Dewatering Flight Conveyor.

YOU can meet the most rigid specifications and prepare and handle materials efficiently and economically through the employment of Link-Belt equipment. Engineers and architects are demanding the best in all structural materials entering into public works construction now under way; the great bulk of which are pavements, sewage treatment plants, sewerage, water treatment plants, water works, buildings, bridges, subways, etc.

Link-Belt washing and dewatering units—log washers, screw washers, dewatering flight conveyors, classifiers, vibrating and conical screens are some of the units in the Link-Belt line that will enable you to obtain better washing, better grading, and an all-around better product, at the lowest cost.

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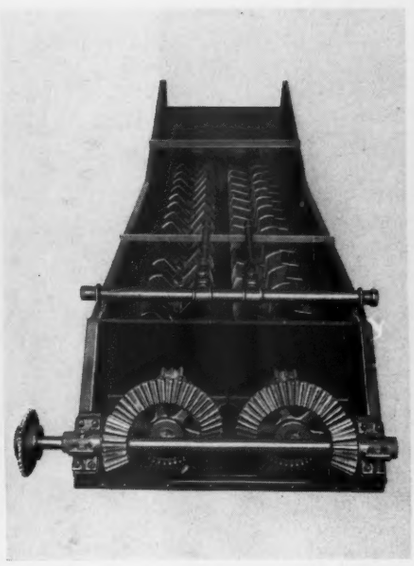
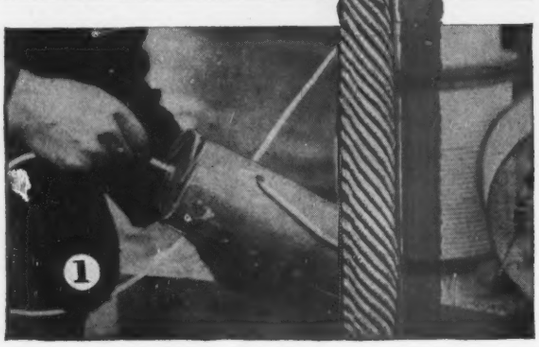
Link-Belt Twin-Screw Dewatering Unit for Sand.



Link-Belt Double Paddle Washer for Gravel and Stone.

Link-Belt Twin-Screw Washer for Gravel.

Get *more work* out of your *Explosives*



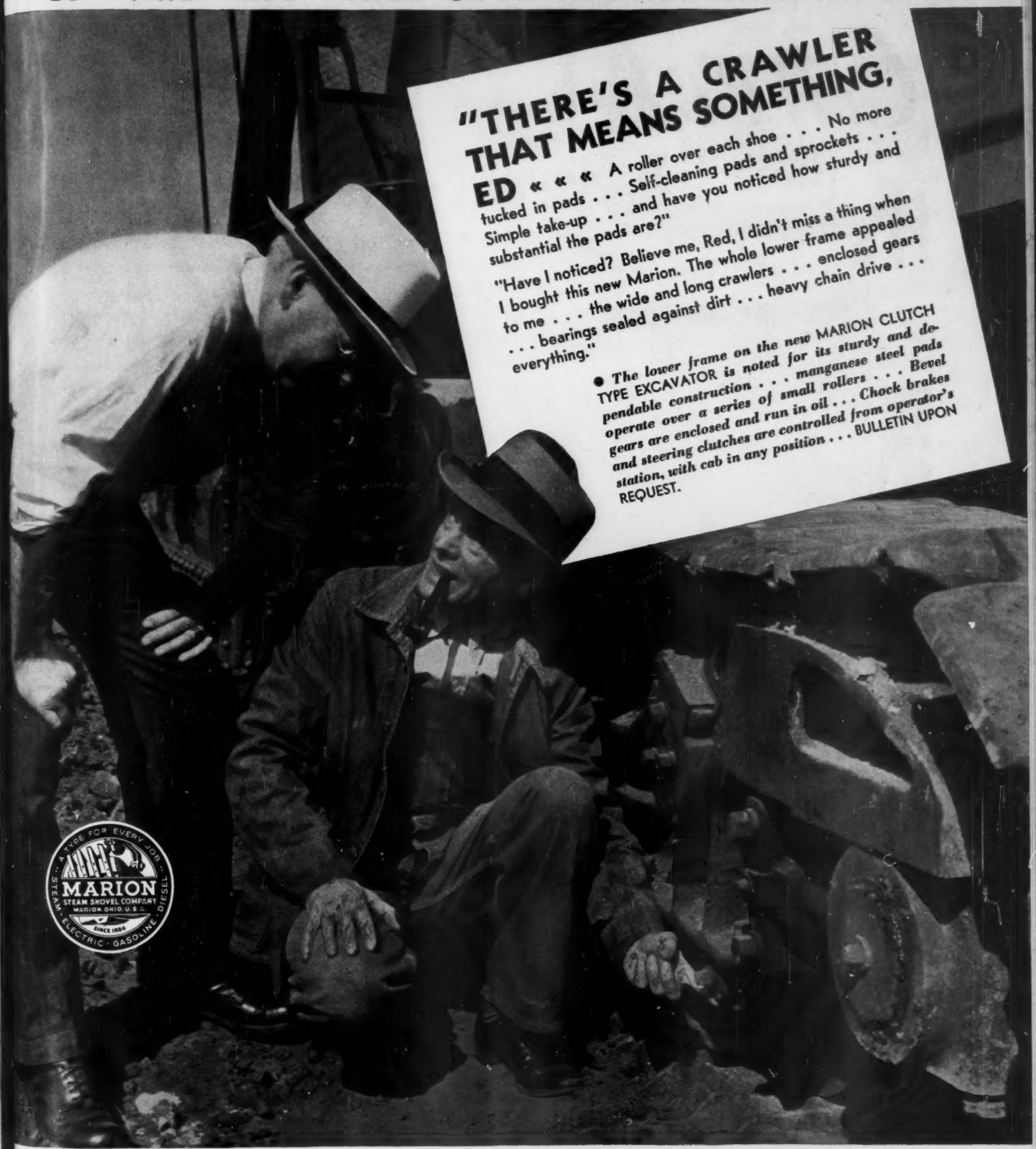
Extra powerful detonation, **not only at the primer cartridge, *but throughout each hole*, is one of the reasons why operators are extending their use of Cordeau-Bickford Detonating Fuse. Its positive action and ease of hookup have made the giant blast practicable--and profitable; yet these are also good reasons why "Cordeau" can be employed profitably in smaller blasts.**

There is a new technique in blasting that will interest you. It is fully explained in the Cordeau book -- free. The Ensign-Bickford Company, Simsbury, Conn.

CORDEAU DETONATING FUSE BICKFORD

CB2

"ED" AND "RED" TALK OVER THE NEW MARION LINE



"THERE'S A CRAWLER THAT MEANS SOMETHING, ED"

"« « « A roller over each shoe . . . No more tucked in pads . . . Self-cleaning pads and sprockets . . . Simple take-up . . . and have you noticed how sturdy and substantial the pads are?"

"Have I noticed? Believe me, Red, I didn't miss a thing when I bought this new Marion. The whole lower frame appealed to me . . . the wide and long crawlers . . . enclosed gears . . . bearings sealed against dirt . . . heavy chain drive . . . everything."

● *The lower frame on the new* MARION CLUTCH TYPE EXCAVATOR *is noted for its sturdy and dependable construction . . . manganese steel pads operate over a series of small rollers . . . Bevel gears are enclosed and run in oil . . . Chock brakes and steering clutches are controlled from operator's station, with cab in any position . . .* BULLETIN UPON REQUEST.

MARION STEAM SHOVEL COMPANY MARION, OHIO, U.S.A. SINCE 1884 — A TYPE FOR EVERY JOB — STEAM · ELECTRIC · GASOLINE · DIESEL

SMALL REVOLVING GROUP

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Type 340	1 cu. yd.
Type 351	1¼ cu. yd.
Type 361	1½ cu. yd.
Type 371	1¾ cu. yd.

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Type 450	1¼ cu. yd.
Type 460	1½ cu. yd.
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STEAM SHOVEL CO., MARION, OHIO, U.S.A.

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INTERMEDIATE REVOLVING GROUP

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Type 480	2 cu. yd.
Type 490	2½ cu. yd.
Type 4101	2½ cu. yd.
Type 4120	3 cu. yd.
Type 4160	4 cu. yd.

Four Belt Crawler Class

Type 5120	3 cu. yd.
Type 125	4 cu. yd.

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Type 5320	8 to 12 cu. yd.
Type 5480	12 to 16 cu. yd.
Type 5560	16 to 20 cu. yd.

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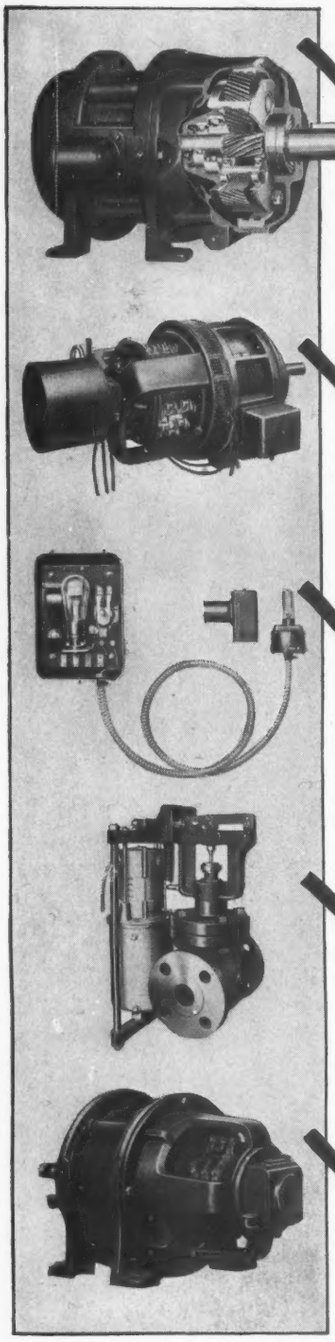
these G-E Money-Saving Equipments



GEAR-MOTOR — a G-E motor with a built-in speed reducer combined into a compact, efficient, and economical unit ready for direct connection to your machine. It will provide the desired speed at the output shaft. These units are available for use on any standard a-c. or d-c. power supply. Wherever you need a dependable low-speed drive that is low in maintenance and high in efficiency, specify G-E Gear-motors.

BTA MOTORS — the most efficient, adjustable-speed, a-c. motors ever built. They offer you the desirable characteristics of shunt-wound d-c. motors, without conversion equipment. They will provide accurate speed control for your rotary kilns, conveyors, fans, feeders, etc. Let these dependable drives help you in lowering your 1934 operating costs.

PHOTOELECTRIC CONTROL — the electric eye that, by a beam of light, can be used to control accurately such operations as weighing, counting, sorting, lighting, etc., without human or mechanical errors. For example: this equipment is now used to proportion, automatically, cement and aggregate in ready-mixed-concrete plants. You have many applications for this labor-saving device. Don't fail to check it.

THRUSTOR VALVES — superior valves operated by G-E Thrustors — those self-contained, motor-operated, hydraulic cylinders that produce a smooth, straight-line, constant pressure thrust. Advantages: remote control, smooth action, no water hammer, few wearing parts. Consider these valves for handling slurry, water, oil, etc. They will save you time and money.

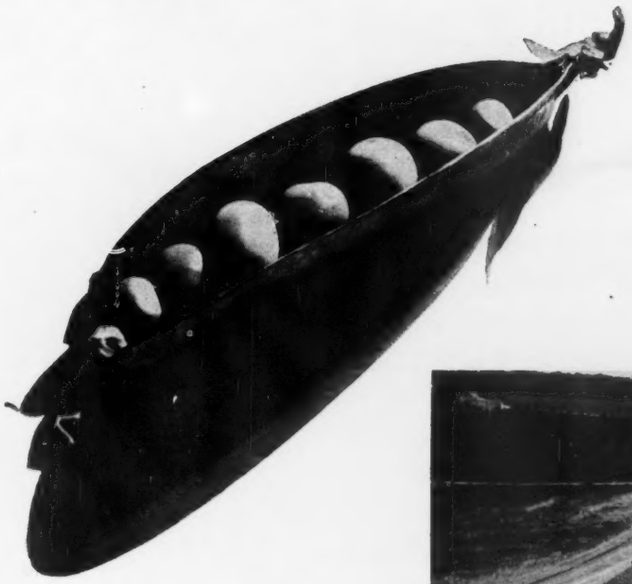
POWER SELSYN DEVICES — provide a positive, accurate method of synchronizing two or more drives, such as a machine with its feeder, or a number of conveyors, or related drives in general. If you want to improve the quality of your product, it will pay you to investigate G-E power Selsyn devices for synchronizing your slurry-feeder with the kiln.

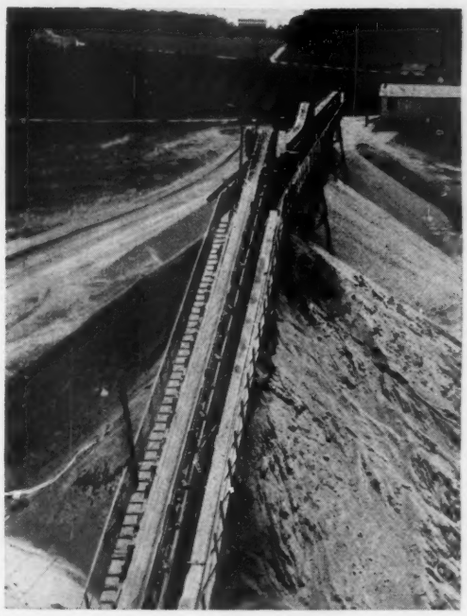
If you would like additional information on any of these G-E money-saving equipments, address your nearest G-E office or General Electric Company, Schenectady, N. Y.

200-672

GENERAL ELECTRIC

as UNLIKE *as Two Peas in a Pod*





Two products, made by different manufacturers, built to the same specifications, for identical duty, may differ as widely as two peas in a pod—the old saw to the contrary notwithstanding.

This difference has cost some users of mechanical rubber goods millions of dollars—as it has earned millions for others.

It is a matter of record that outstanding technical personnel, 90 years of experience, extraordinary facilities for research and manufacture and progressive business policies have made the United States Rubber Company the world's largest manufacturer of industrial rubber equipment.

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STOCKS IN ALL INDUSTRIAL CENTERS

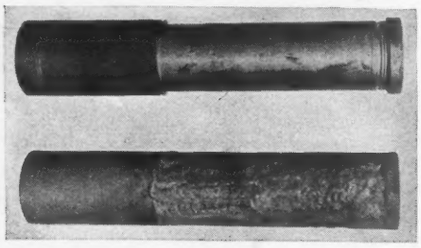
Hard-Facing Hints and Helps

Haynes Stellited Parts Last Longer

Pump Shafts

Figures obtained from a Los Angeles company prove the economy of rebuilding pump shafts with Haynes Stellite. Haynes Stellited pump shafts last six weeks before rebuilding is necessary, whereas ordinary steel shafts were unfit for use after one week of service.

CASE No. 5192**



Shafting rebuilt by Haynes Stelliting

Pulverizer Plows

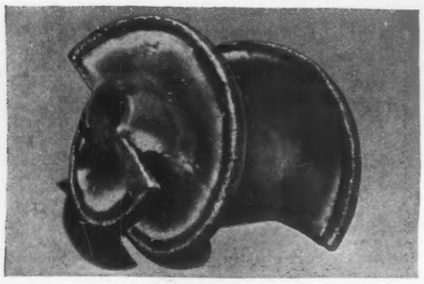
An Eastern cement plant formerly used chilled iron plows for pulverizing the cement clinker after cooling. Haynes Stelliting of plows and plow arms has proved decidedly economical. The hard-faced plows give four times longer service than unprotected plows.

CASE No. 5381**

Mixing Machine Augurs

Hard-facing of mixing machine augurs has effected important savings at a Utah pressed brick company. A cast steel augur costs $86.00 and after 45 days is unfit for service. A Haynes Stellited augur, hard-faced at a total cost of $22.00, lasts 90 days and can be re-Stellited.

CASE No. 3972**



Haynes Stelliting doubled the life of this augur

Conveyor Sleeves

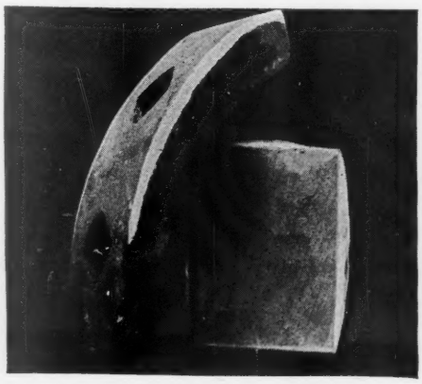
Steel sleeve protectors on conveying equipment lasted an average of 6 days under the severe operating conditions in a Mid-Western cement plant. These sleeves cost $9.00 each and it usually required two men half a day to replace one set. Since production time was valued at $250 per hour, replacement of a set of sleeves cost more than $1000. A set of sleeves was hard-faced with Haynes Stellite as an experiment. After 6 weeks of constant use, they showed only slight signs of wear. This major saving in replacement cost and time has caused the plant to standardize on Haynes Stellited sleeves.

CASE No. 1685**

Feeder Shoes

Chilled cast iron feeder shoes for brick machines in a Wisconsin plant last eight days, averaging 91,000 bricks per day. Haynes Stelliting has increased the life of the shoes to 80 days and the hard-faced shoes turn out 100,000 bricks per day. The chilled iron shoes cost $1.50 and Haynes Stellited shoes cost $5.00. Thus, at an increased cost of slightly more than three times, hard-facing has increased the life of the shoes 10 times and increased the daily output by approximately 9 per cent.

CASE No. 3855**

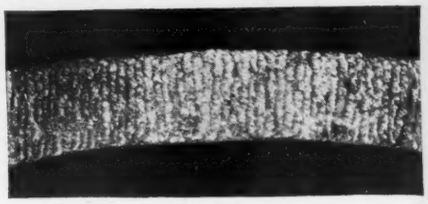


Haynes Stellited feeder shoes

Grinder Rings

In an Illinois cement plant, grinder rings hard-faced with Haynes Stellite were put to a test against rings faced with an iron base alloy. The Haynes Stellited rings, which are now standard at this plant, lasted 4640 hours, whereas the other rings were unfit for service after 2334 hours. One ring, which was particularly worn, was rebuilt by filling up the holes and worn spots with 145-lb. of steel. This surface—1709 sq. in.—was then covered with 125-lb. of Haynes Stellite. Recent reports state that the average run of continual service has been increased to from 5300 to 5600 hours. Individual Haynes Stellited rings have run as long as 6100 hours.

CASE No. 3821**

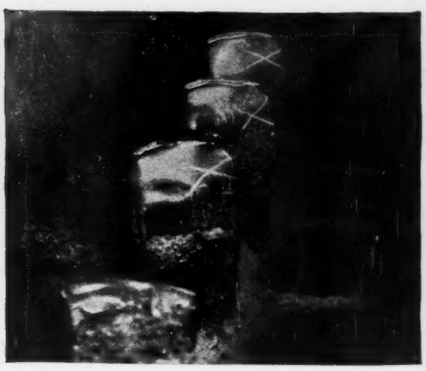


Section of a Haynes Stellited grinder ring

Pug Mill Knives

At an Illinois clay products plant, three pug mill knives, hard-faced with ⅛ in. of Haynes Stellite were put into service to determine their life as against new steel knives. After 2½ months, the steel knives had worn down 1½ in. The Haynes Stellited knives had scarcely worn at all and still retained their original length.

CASE No. 3971**



Compare the Haynes Stellited knives (marked X) with the steel knife in the foreground

** For further details on this and similar money saving applications of Haynes Stellite refer the case number to Haynes Stellite Company, Kokomo, Ind.

HAYNES STELLITE MARK TRADE REG. U.S. PAT. OFF.

A red-hard, wear-resisting alloy of Cobalt, Chromium and Tungsten

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Haynes Stellite Welding Rods and information on other Haynes Stellite Products also are available through the 42 apparatus shipping points of The Linde Air Products Company

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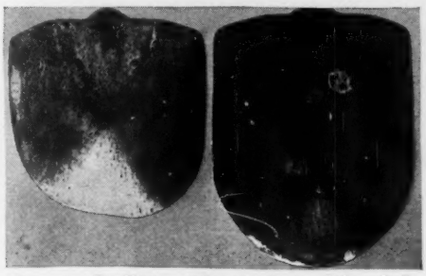
Hard-Facing Hints and Helps

Build Wear-Resistance Where You Need It

On Hand Shovels

A Western concern hard-faced hand shovels, increasing their life two to three times, depending on the nature of the material handled. Haynes Stellite is placed on the bottom of the shovel to form a wear-resisting band about ⅜ in. wide along the edge. The hard-facing cost is only 9 cents per shovel.

CASE No. 3550**

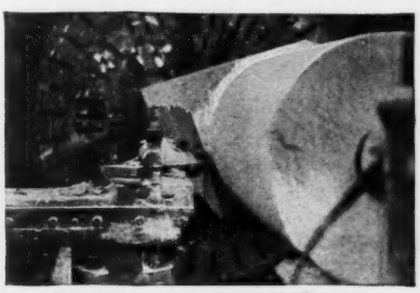


Haynes Stelliting Doubled the life of the shovel on the right

On Lathe Tools

At a stone quarry, Haynes Stellited lathe tools turned 18 columns of limestone, each 5 ft. 5 in. in diameter and 10 ft. 2 in. long. Each column was finished completely before regrinding was necessary, while a tool unprotected by Haynes Stellite required at least two grindings on such a column.

CASE No. 2884**

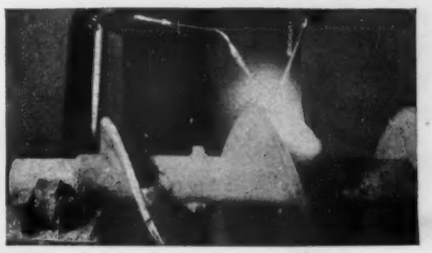


Turning columns with Haynes Stellited tools

On Dipper Teeth

At a Long Island concern cast Hascrome dipper tooth tips last more than twice as long as manganese steel tips. The latter had a total life of three days while the Hascrome tips were only two-thirds to three-quarters worn out after six days' service.

CASE No. 5377**



Haynes Stelliting a conveyor screw

On Screw Conveyors

Haynes Stelliting has become standard practice for building up screws used to convey pulverized rock. Frequent replacements had formerly been necessary because of the abrasive nature of the material. The flights of the screw, which are surfaced with Haynes Stellite, have many times longer life and can be rebuilt again and again.

CASE No. 2884**

On Crusher Mantles

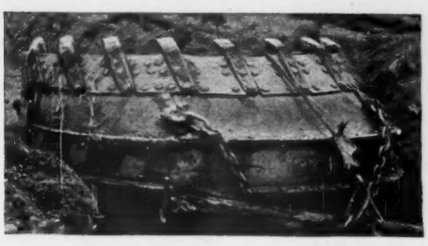
After six months use, manganese steel crusher mantles at a California plant were practically worn through the 2½ in. wall. One of these castings was reclaimed by building-up the worn surface with Hascrome. Ninety pounds of Hascrome was used and the total cost of rebuilding amounted to slightly more than 25 per cent of the cost of a new mantle. During four months of continuous service this reclaimed mantle were down only 5/32 in.

CASE No. 3708**

On Drag Scraper Teeth

At a Michigan gravel company, the life of unprotected drag scraper teeth and cutters was ten days. In two months, six sets of teeth wore out at a cost of $690.00 ($115.00 per set). Now two sets of Haynes Stellited teeth last the same length of time at a total cost of $571.00, a direct saving of $59.50 per month or $714.00 annually. This does not include the cost of time formerly lost through shutdowns for replacement when unprotected teeth were used.

CASE No. 5351**

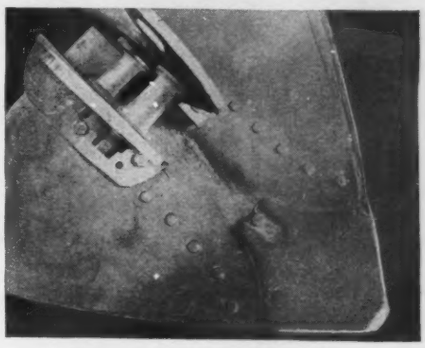


Haynes Stelliting saves $714 a year

On Excavating Buckets

Haynes Stelliting orange peel excavating buckets for a Nevada concern increased service life more than 4 to 1. The first application on the edges of the dipper leaves required about 1-lb. of Haynes Stellite but only ¼-lb. is necessary for resurfacing the leaves.

CASE No. 4992**

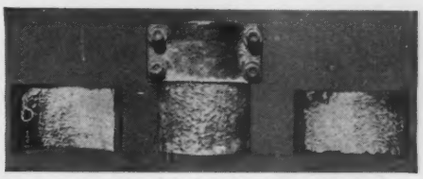


Haynes Stellited dipper leaf

On Bearings and Bushings

Hard-facing of a bottom guide bearing and bushing for a travelling agitator has proved very successful in an Alabama cement plant. The usual life of unprotected parts is only six months. Haynes Stellited bearings and bushings have been in operation 20 months and are still in service.

CASE No. 3955**



Haynes Stellited and ready for grinding

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HAYNES STELLITE TRADE MARK REG. U.S. PAT. OFF.

A red-hard, wear-resisting alloy of Cobalt, Chromium and Tungsten

HAYNES STELLITE COMPANY

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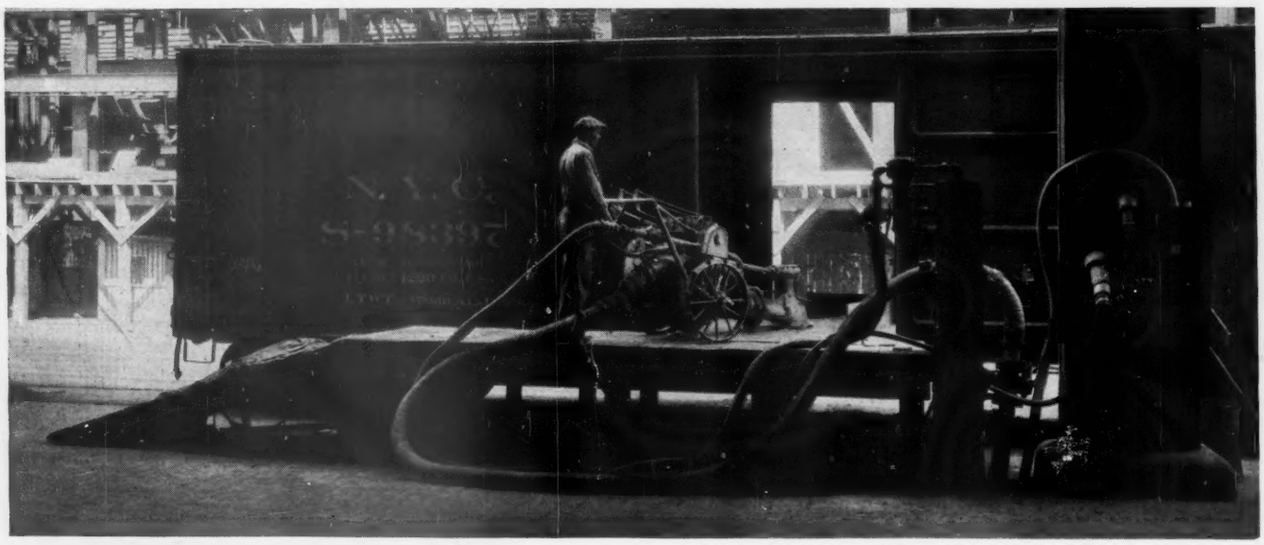
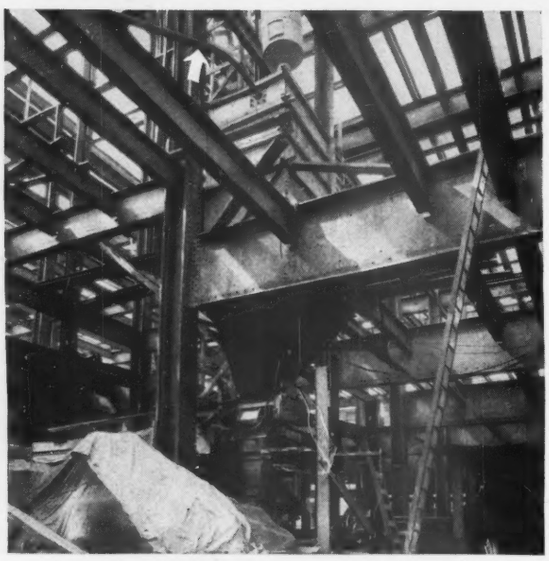
It unloaded cement barges for

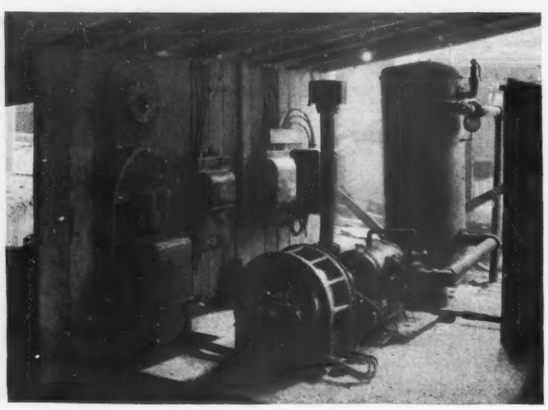
THE WORLD'S LARGEST ELEVATOR

It is now unloading cars for

A GREAT FREIGHT TERMINAL







The portable Fuller-Kinyon Pump shown above is unloading cement for the construction of the St. Johns Park Freight Terminal of the New York Central Railroad. The cement is pumped to two mixing plants in different parts of the building. The conveying distance to each plant is in excess of 400 feet. One of the mixing plants was moved to a new location as the work progressed. Approximately 82,000 barrels of cement will be required.

The same pump handled the 84,000 barrels of cement required for the construction of the grain elevator for the Port of Albany. On this job it unloaded both barges and box cars, conveying either directly to the mixing plant through an underground pipe line, or to a storage shed. The same pump was used for conveying from the shed to the mixing plant.

One of the mixer bins on the present job is shown at the left, the cement transport line being indicated by the arrow.

A remotely controlled, fully automatic Fuller Cement Batcher withdraws cement from this bin. This is the second job for this batcher. Another Fuller Automatic Batcher, of newer design, is used at the other plant.

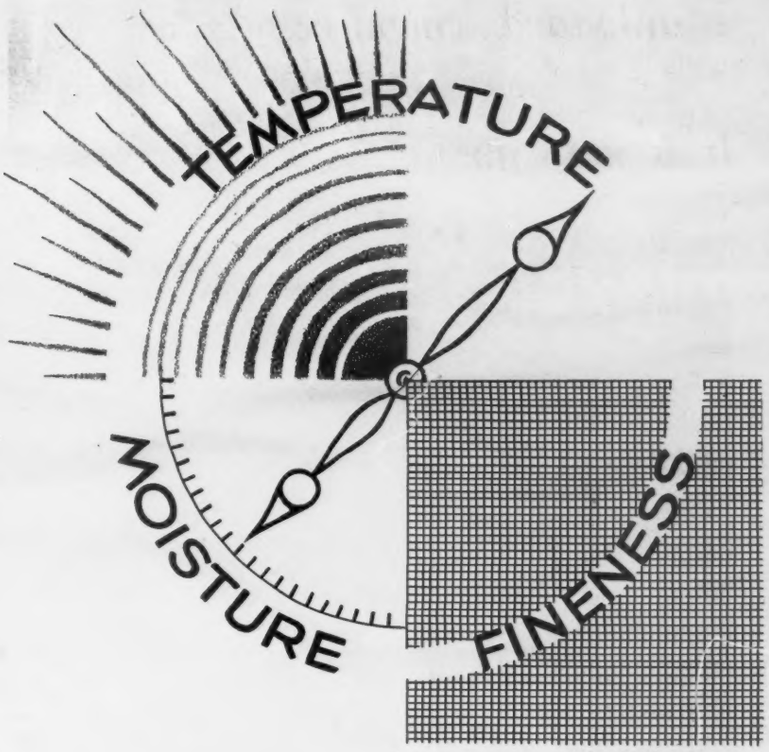
Compressed air is furnished by the single-stage Fuller Rotary Compressor shown below. This compressor was also used at Albany. These rugged machines, with their extraordinary capacities, are especially adapted to the service conditions of construction plants.

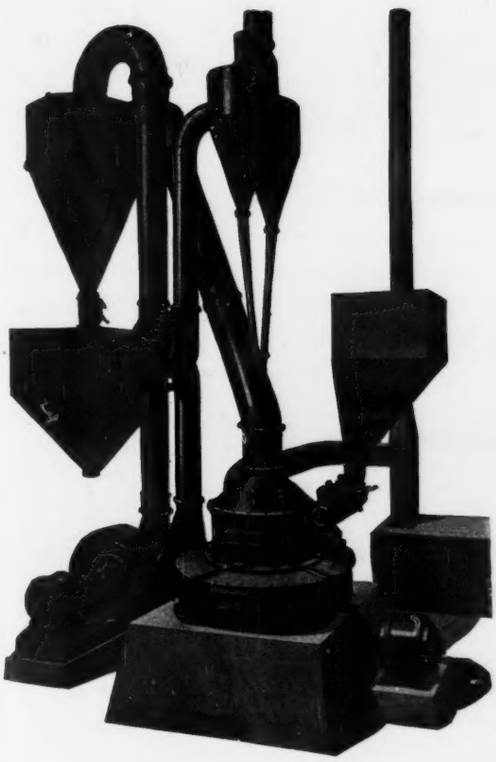
Chicago: 1118 Marquette Bldg.

Fuller Company

CATASAUQUA, PENNA., U. S. A.

THREE POINT CONTROL





GOVERNING the quality of your product—now more important than ever because of today's exacting specifications—is easily accomplished with the Raymond Roller Kiln Mill.

FINENESS is regulated by the new whizzer air separator—an outstanding improvement in pulverizing equipment—which gives any desired degree of classification from coarse grind up to 99% through 325-mesh or better, a most efficient method of pulverizing various rock products in custom grinding plants.

DRYNESS of the finished product is determined by the air-drying system which evaporates the moisture to any required percentage during the pulverizing process, eliminating separate dryers and assuring a fine, dry, free-flowing material. This is the modern method of calcining gypsum and performing many other "drying-in-the-mill" operations.

TEMPERATURE control is important in many processes, where the product is sensitive to extreme heat. Delicate materials can be handled in the Kiln Mill without danger of discoloring or "burning" as the controlled heat supply is held uniform, and overheating is prevented because of the moisture always present in the system.

RAYMOND Roller Mills include many advanced features that insure highly profitable production. Tell us your requirements in pulverizing, drying, separating and dust collecting. Our 46 years' experience are at your service.

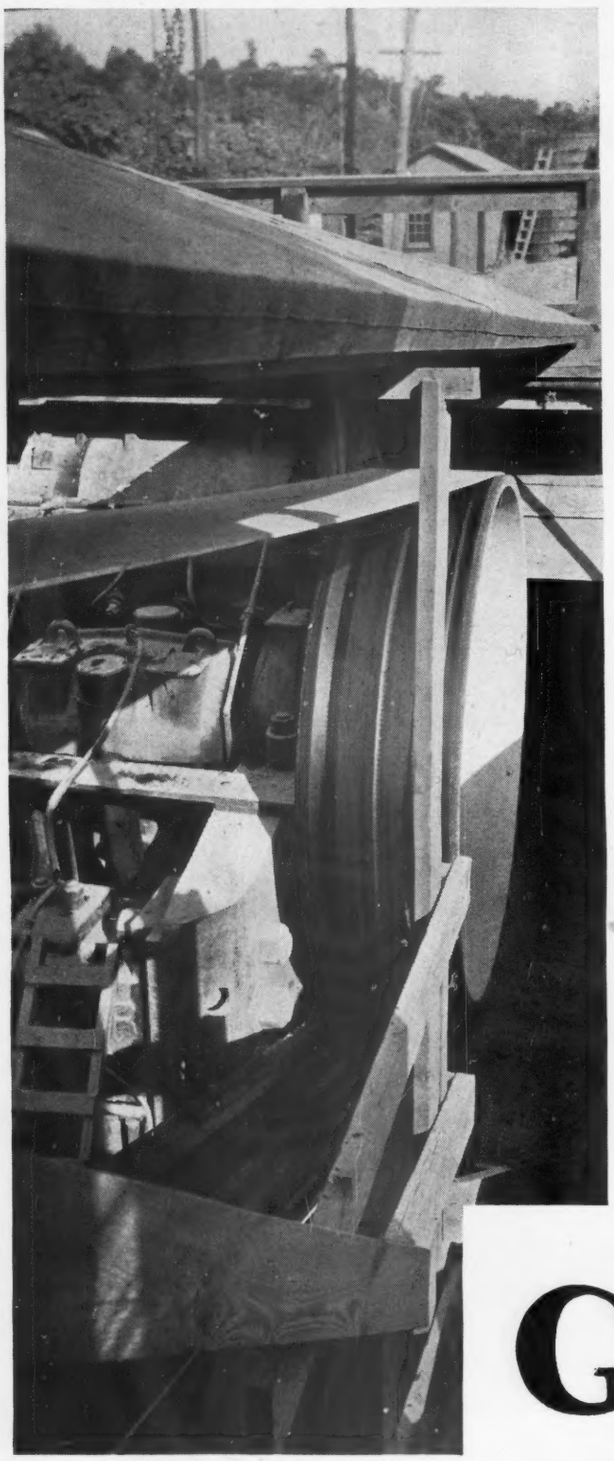
ORIGINATORS OF AIR SEPARATION
PIONEERS OF PULVERIZING
SINCE 1887

RAYMOND BROS. IMPACT PULVERIZER CO.

Main Office and Works: 1307 North Branch Street, Chicago
Eastern Office: 200 Madison Avenue, New York
Western Office: San Fernando Bldg., Los Angeles

• • BELTING THAT

despite the ravages of crusher operation



IF THE SEVERITY of crusher operation were confined to the materials handled, or to the crusher itself, one more vexation in the rock products industry could be forgotten. But it isn't. On every crusher drive, belting must be adapted to the roughest of operating conditions. Jerkily . . . spasmodically . . . brutally—the crusher demands power. Instantly . . . unfailingly . . . at peak load—the belt must respond. It must operate in perfect harmony with the dictates of these relentless drives.

Certainly it is on such drives that transmission belting faces its supreme test. It must absorb an unbelievable amount of strain, particularly at the fasteners.

Recognition of this condition several years ago inspired a series of laboratory and field tests which gave the answer—Goodrich Highflex Transmission Belting. The close, compact weave of the duck in Highflex provides ideal anchorage for fasteners of all types. The maintenance of uniform tension across its width permits each hook or lacing to bear its equal share of the load.

Strain-resistance at the fasteners has been accomplished, but never at the sacrifice of those other qualities which distinguish Goodrich belts. Highflex insures you freedom from excessive slippage, abnormal stretching, open seams and ply separation. No improvement in material or refine-

● *View of Crusher Drive in a Southern Stone Quarry.*

Goodrich

ASKS NO MERCY

● *After many months of severe quarry service, this Highflex Belt is still in excellent condition.*

ment in manufacture has been overlooked in building these qualities into every belt.

Highflex can be *made endless at the factory.* This more than justifies the expense and inconvenience of installation for it effectively solves fastener problems, insures smoother operation, transmits more power and increases the life of the belt. Whenever it is impracticable to order factory-built endless belts, Highflex can be *made endless on the job* by means of portable vulcanizers.

If you are not already familiar with Goodrich Highflex Belting, have not seen it perform, write for the book—"A New Rubber that Turns the Wheels of Industry."...The B. F. Goodrich Rubber Company, Mechanical Rubber Goods Division, Akron, Ohio.

GOODRICH MECHANICAL RUBBER GOODS FOR THE ROCK PRODUCTS INDUSTRY INCLUDE:

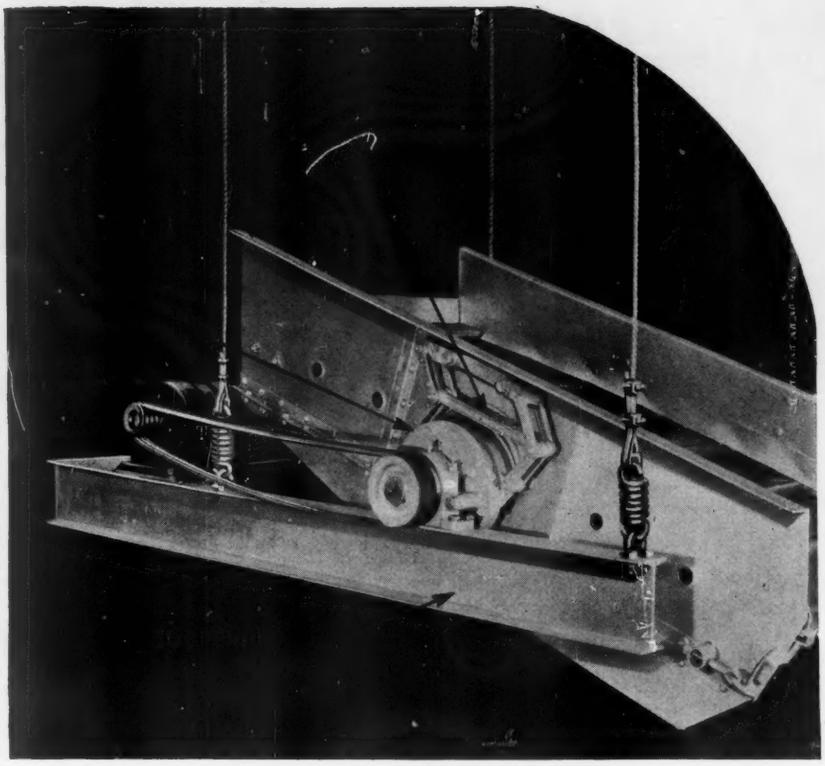
- *Air, Water, Fire, Steam, Suction and Cement Discharge Hose.*
- *Conveyor, Elevator and Transmission Belting.*
- *Rubber Lining for Ball Mills.*
- *Chute Lining.*
- *Dredging Sleeves.*
- *Packing . . . and*
- *A Complete Line of Miscellaneous Rubber Items.*

ALL *products problems* **IN RUBBER**

Highflex Belting

NRA MEMBER U.S. WE DO OUR PART

SKF EQUIPPED
BUILT BY
STEPHENS-ADAMSON MFG. CO.



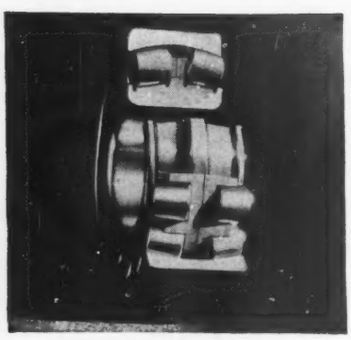
PERFORMANCE BY SKF ON TOUGH JOBS

▼ ▼ ▼ ALWAYS WINS

"FOUR new features for the S-A Vibrator Screen," says Stephens-Adamson . . . but SKF Spherical Roller Bearings go on as usual. Plenty of good reason for such continued confidence . . . just one word . . . *PERFORMANCE.* SKF Bearings have been on the job for years on many S-A Screens . . . and always proving a paying investment.

Way up at the top of the list of the many features stressed by this manufacturer are the SKF Bearings used throughout the mechanism. Ruggedness, reliability, freedom from wear and no adjustments mean much to equipment in the rock products industry. These are the outstanding characteristics of SKF's. These are the things S-A counts on when they say, "greater capacity, more accurate separation, smoother operation and longer life."

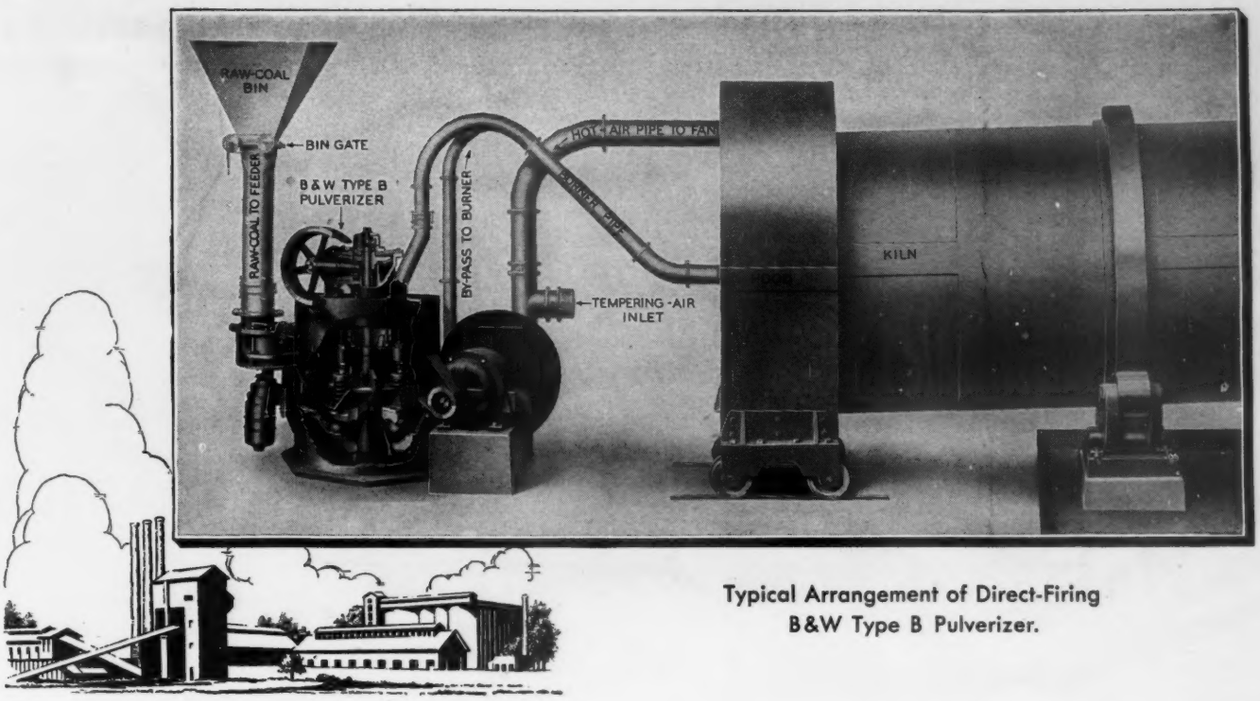
●*You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little*



3138

SKF INDUSTRIES, INC., 40 EAST 34th STREET, NEW YORK, N. Y.

SKF
Ball and Roller Bearings



Typical Arrangement of Direct-Firing B&W Type B Pulverizer.

What Price Coal Plant?

Direct firing of kilns with B&W Type B Pulverizers eliminates driers and furnaces, dust nuisances common to coal plants, much re-handling of coal, motors, and other accessories. It also offers greater kiln efficiency by reason of more uniform feed, better mixing of coal and air, and avoidance of pulsations. The principle of direct firing has long been recognized as correct; its acceptance awaited the development of a reliable pulverizer.

The B&W Type B Pulverizer with Integral Feeder and Blower was developed especially for such service. It is a sturdy, ball-bearing-principle pulverizer having a high degree of reliability. It has a low rate of wear of the grinding parts and maintains a uniform high fineness throughout the life of the grinding parts. It is economical to operate.

Let us show you how, with this pulverizer, you can reduce the cost of burning clinker. Write for details, or, better still, ask to have a B&W Representative call. No obligation, of course. The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y.

BABCOCK & WILCOX

F-277

WHY SHOULD I

Attend the January Conventions of the

NATIONAL CRUSHED STONE ASSOCIATION: NATIONAL SAND & GRAVEL ASSOCIATION: NATIONAL SLAG ASSOCIATION?

If a Producer of Aggregates,

I would feel it absolutely necessary to learn as much as possible about the NRA and the Code Authority and what they are going to do to my business.

I would like to have a look at the members of the Code Authority and get personally acquainted with them.

I would like to see if something can be done to prevent waste of the taxpayers' money, used to open up numerous small public-owned quarries and gravel pits in competition with my legitimate business.

I would like to discuss with other operators what they are doing and going to do to get costs down so as to make a profit without raising prices to a point that will increase competition by public authorities.

I would like to see where and how the three national associations fit into the picture.

I would like to be an actor in this stirring drama of government partnership in business, rather than a mere spectator.

I would like to feel, no matter how small my operation, that I am a real factor in this congress of a great industry, and that I am going to have a chance to express my opinions as well as listen to others.

I would like to be a good sport and prove that I can rub elbows with my competitors from far and near, and prove to them that I can go as far as anyone in support of a good cause.

If a Manufacturer of Equipment:

I would not let this opportunity slip by to get first-hand information about my prospects.

I would not neglect this opportunity to discuss with them the possibilities of their cost-saving through new and more modern equipment.

I would not be cast down by the provision in the Code regulating new productive facilities.

I would try to capitalize the fact that my customers are going to be established producers with money to pay for what they order.

I would base my sales quota on their necessity to lower costs and make better products.

I would make use of my opportunity to meet with these all-time regular customers and prove to them that I don't expect to see my market for equipment annihilated, and that I am 100% with them in their desire to make money enough to rehabilitate their plants.

18th Annual Convention
NATIONAL SAND & GRAVEL ASSOCIATION

17th Annual Convention
NATIONAL CRUSHED STONE ASSOCIATION

16th Annual Meeting
NATIONAL SLAG ASSOCIATION

All Together

Netherland Plaza Hotel, Cincinnati, Ohio
Week of January 22, 1934

EVERY PRODUCER INVITED, WHETHER MEMBER OF ASSOCIATION OR NOT

ASSOCIATE MEMBERS AND EQUIPMENT MANUFACTURERS WILL BE WELCOME

SPECIAL ROUND TRIP RAILWAY FARES FROM ALL POINTS

GENERAL MEETING UNDER AUSPICES OF THE CODE AUTHORITY

SPECIAL SESSIONS OF EACH ASSOCIATION

Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

This classified directory of advertisers in this issue is published as an aid to the reader. Every care is taken to make it accurate, but ROCK PRODUCTS assumes no responsibility for errors or omissions. The publishers will appreciate receiving notice of omissions or errors, or suggestions

Acetylene Welding Rod
Haynes Stellite Co.

Agitators, Thickeners and Slurry Mixers
F. L. Smidth & Co.

Air Compressors
Fuller Co.
Nordberg Mfg. Co.
Traylor Eng. & Mfg. Co.

Air Filters
Fuller Co.

Air Separators
Bradley Pulverizer Co.
Raymond Bros. Impact Pulv. Co.

Alloys (Metal)
Haynes Stellite Co.

Armorite (for Chute Lining)
Goodrich Rubber Co., B. F.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

Backfillers
Bucyrus-Erie Company
Harnischfeger Corp.
Ohio Power Shovel Co.

Ball Bearings
S K F Industries, Inc.

Balls, Grinding (See Grinding Balls)

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.

Bearings
Haynes Stellite Co.
Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
S K F Industries, Inc.

Bearings (Anti-Friction)
S K F Industries, Inc.

Bearings (Roller)
S K F Industries, Inc.

Bearings (Tapered Roller)

Bearings (Thrust)
S K F Industries, Inc.

Belting
Robins Conveying Belt Co.

Belting (Elevator and Conveyor)
Goodrich Rubber Co., B. F.
United States Rubber Co.

Belting, Transmission
Goodrich Rubber Co., B. F.

Bins
Traylor Eng. & Mfg. Co.

Bin Gates
Fuller Co.
Link-Belt Co.
Traylor Eng. & Mfg. Co.

Blast Hole Drills (See Drills)

Blasting Cap Protectors
Goodrich Rubber Co., B. F.

Blasting Supplies
Hercules Powder Co.

Blocks (Pillow, Roller Bearing)
Link-Belt Co.
S K F Industries, Inc.

Boilers
Babcock & Wilcox Co.

Boots and Shoes
Goodrich Rubber Co., B. F.
United States Rubber Co.

Breakers (Primary)
Smith Engineering Works

Buckets (Dragline and Slackline)
Bucyrus-Erie Co.
Wellman Eng. Co. (G. H. Williams Co.)

Buckets (Dredging and Excavating)
Harnischfeger Corp.
Wellman Engineering Co. (G. H. Williams Co.)

Buckets (Elevator and Conveyor)
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Harnischfeger Corp.
Hayward Co.
Link-Belt Co.
Wellman Engineering Co. (G. H. Williams Co.)

Cableways
General Electric Co.
Link-Belt Co.
Roebling's Sons Co., John A.
Wellman Eng. Co. (G. H. Williams Co.)
Williamsport Wire Rope Co.

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Hercules Powder Co.

Car Pullers
Link-Belt Co.

Castings
Babcock & Wilcox Co.
Eagle Iron Works (Grey Iron)
Haynes Stellite Co.
Link-Belt Co.

Cement Making Machinery
F. L. Smidth & Co.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.

Chain (Elevating and Conveying)
Link-Belt Co.

Chain Drives

Chain Systems (Kilns)
F. L. Smidth & Co.

Clamshell Buckets (See Buckets, Clamshell, Grab, etc.)

Classifiers
Knickerbocker Company.
Link-Belt Co.

Clips (Wire Rope)
Williamsport Wire Rope Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Bradley Pulverizer Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.

Compressors (See Air Compressors)

Conveyor Idlers and Rolls
Link-Belt Co.
Robins Conveying Belt Co.

Conveyors and Elevators
Earle C. Bacon, Inc.
Fuller Company
Jeffrey Mfg. Co. (Vibrating).
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Flexible and Shaft)
Link-Belt Co.

Couplings (Hose, Pipe, Etc.)
Goodrich Rubber Co., B. F.
United States Rubber Co.

Cranes (Clamshell)
Bucyrus-Erie Co.
Harnischfeger Corp.

Cranes (Crawler and Locomotive)
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.
Marion Steam Shovel Co.
Ohio Power Shovel Co.

Cranes (Overhead Traveling Electric)
Harnischfeger Corp.

Crusher Parts
Pennsylvania Crusher Co.

Crushers (Hammer)
Pennsylvania Crusher Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc. (Jaw)
Good Roads Machy. Corp.
Lewistown Fdy. & Mach. Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Crushers (Single Roll)
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Traylor Eng. & Mfg. Co.

Derricks and Derrick Fittings
Harnischfeger Corp.
Wellman Eng. Co. (G. H. Williams Co.)

Diaphragms (Pump)
Goodrich Rubber Co., B. F.
United States Rubber Co.

Diesel Engines (See Engines, Diesel)

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.
Marion Steam Shovel Co.

Ditchers
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline Excavators
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.
Ohio Power Shovel Co.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.

Dragline Excavators (Walking)

Dredge Chain (See Chain)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Marion Steam Shovel Co.
Morris Machine Works

Dredging Sleeves
Goodrich Rubber Co., B. F.
United States Rubber Co.

Drilling Accessories
Loomis Machine Co.

Drills
Bucyrus-Erie Co.

Drills (Blasthole)
Loomis Machine Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Traylor Eng. & Mfg. Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.

Dust Conveying Systems
Fuller Co.

Dynamite
Hercules Powder Co.

Electric Cables and Wires
Roebling's Sons Co., John A.

Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevators (See Conveyors and Elevators)

Engineers
Productive Equipment Corp.
F. L. Smidth & Co.

Engines (Diesel)
Nordberg Mfg. Co.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Explosives
Hercules Powder Co.

Fans
General Electric Co.

Feeders
Babcock & Wilcox Co. (Pulverized Coal)
Fuller Co. (Cement and Pulverized Material)
Robins Conveying Belt Co.
Smith Engineering Works (Plate)

Furnaces

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Fuses (Electrical)
General Electric Co.

Gaskets
Goodrich Rubber Co., B. F.
United States Rubber Co.

Gates, Bin (See Bin Gates)

Gears and Pinions
General Electric Co.
Link-Belt Co.

Grab Buckets (See Buckets, Clamshell, Grab, etc.)

Grapples (Stone)
Hayward Co.
Wellman Eng. Co. (G. H. Williams Co.)

Grinding Balls
Babcock & Wilcox Co.

Grizzlies
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

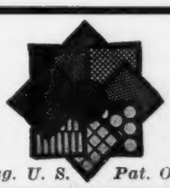
Different in Appearance-- and *Different* in Screening Action

Perhaps you are not familiar with Hendrick Double Corrugated Plate. A glance at this illustration and you'll realize that it's a different kind of plate—different in appearance and different in screening action. The double corrugations provide a tumbling action that insures exceptionally clean screening.

Double corrugated — and heat treated for longer wear —this Hendrick plate is ideal for vibrating screens. It improves screening and reduces replacement costs.

HENDRICK MANUFACTURING CO.
47 Dundaff St., Carbondale, Pa.

Makers of ELEVATOR BUCKETS of all types; Mitco Interlocked Steel Grating; Mitco Shur-Site Treads, and Mitco Armorgrids.



Reg. U. S. Pat. Off.

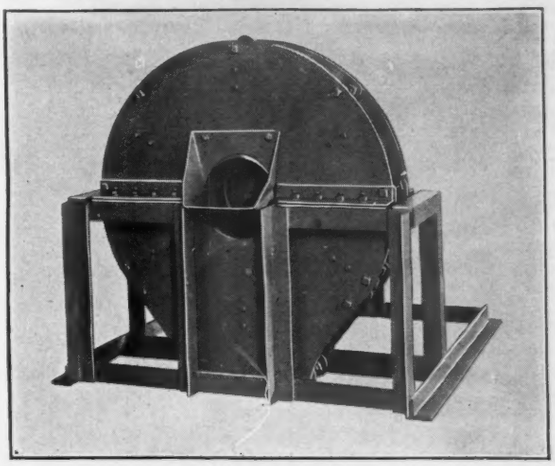
Baltimore . . . Birmingham . . . Boston . . . Cincinnati . . . Cleveland . . . Detroit . . . Hazleton . . . New York . . . Philadelphia . . . Pittsburgh.

KNICKERBOCKER Soft Stone Eliminator

Get Rid of Soft Stone!

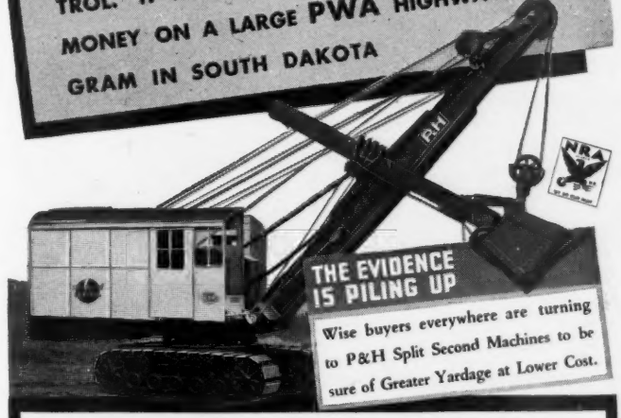
Here's a machine that does it—thoroughly, rapidly, economically. Brings new contracts within your reach. Ask for circular.

THE KNICKERBOCKER COMPANY, Jackson, Michigan



The PIONEER Construction & Engineering Corporation

HAS JUST BOUGHT A P&H MODEL 700B GAS POWERED SHOVEL WITH SPLIT SECOND CONTROL. IT IS MOVING MORE DIRT FOR LESS MONEY ON A LARGE PWA HIGHWAY PROGRAM IN SOUTH DAKOTA



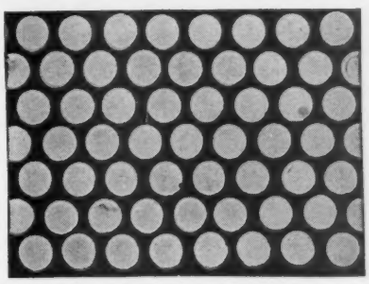
THE EVIDENCE IS PILING UP

Wise buyers everywhere are turning to P&H Split Second Machines to be sure of Greater Yardage at Lower Cost.

HOBOKEN, N. J. 1714 Willow Avenue	JACKSONVILLE, FLA. 1052 East Bay Street	LOS ANGELES, CAL. 2025-9 Santa Fe Avenue
CHICAGO, ILL. 1056 W. Division St.	MEMPHIS, TENN. 307 So. Front Street	SAN FRANCISCO, CAL. 82 Beale Street
MILWAUKEE, WIS. 4465 W. National Ave.	DALLAS, TEXAS 2223 Commerce Street	SEATTLE, WASH. 2911 First Avenue So.

HARNISCHFEGER CORPORATION
Established 1884

MORROW SCREEN PLATES



MORROW PERFORATED METAL SCREEN PLATES for sizing and preparing coal, sand, gravel, stone and other bulk materials are made by a Company specializing in screening machinery.

A complete set of punches and dies covering a wide range of sizes, in round, square, oval and diagonal slots are ready for the press, insuring prompt delivery of orders.

Prices are right
Send for Bulletin 57.

The Morrow Manufacturing Co.
Wellston, Ohio

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Grizzly Feeders
Traylor Eng. & Mfg. Co.

Hammer Mills (See Crushers)

Hard Facing Materials
Haynes Stellite Co.

Hascrome
Haynes Stellite Co.

Hastelloy
Haynes Stellite Co.

Hoists
Harnischfeger Corp.
Link-Belt Co.

Hose (Water, Steam, Air Drill, Sand Suction and Discharge)
Goodrich Rubber Co., B. F.
United States Rubber Co.

Insulation (Electric)
General Electric Co.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.

Kominuters (See Mills)

Lighters (Hot Wire for Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Co.
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

Linings (Iron for Ball and Tube Mills) (See Mill Liners)

Linings (Rubber for Ball and Tube Mills)
Goodrich Rubber Co., B. F.
United States Rubber Co.

Loaders and Unloaders
Bucyrus-Erie Co.
Link-Belt Co.
Marion Steam Shovel Co.
Wellman Eng. Co. (G. H. Williams Co.)

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel)

Locomotives (Diesel-Electric)

Locomotives (Gas Electric)

Locomotives (Oil Electric)

Locomotives (Steam, Gas and Electric)
General Electric Co.

Locomotives (Storage Battery)
General Electric Co.

Log Washer
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants (Wire Rope)

Machine Parts
Haynes Stellite Co.

Machinery Guards
Harrington & King Perforating Co.

Magnets
General Electric Co.

Manganese Steel Castings
The Frog, Switch & Mfg. Co.

Mechanical Rubber Goods
Goodrich Rubber Co., B. F.
United States Rubber Co.

Metals (Acid and Corrosion Resistant)
Haynes Stellite Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
Bradley Pulverizer Co.
Knickerbocker Company.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
F. L. Smidth & Co.

Mixers (Commercial Concrete)
Jaeger Machine Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.
General Electric Co.
Harnischfeger Corp.

Oil Burners
Babcock & Wilcox Co.

Packing
United States Rubber Co.

Packings (Pump, Valve, Etc.)
Goodrich Rubber Co., B. F.
United States Rubber Co.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
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Morrow Mfg. Co.

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Fuller Company
Link-Belt Co.

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Babcock & Wilcox Co.
Bradley Pulverizer Co.
Knickerbocker Company.
Raymond Bros. Impact Pulv. Co.
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Haynes Stellite Co.

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Fuller Co.

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Cross Engineering Co.
Harrington & King Perf. Co.
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Robins Conveying Belt Co.
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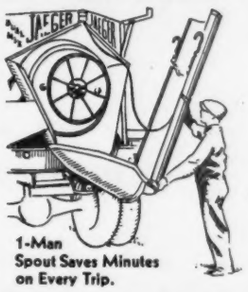

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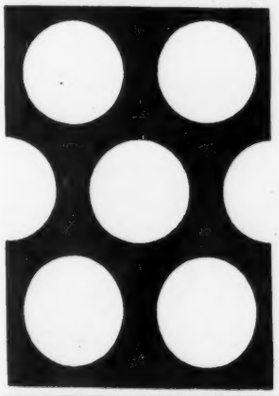

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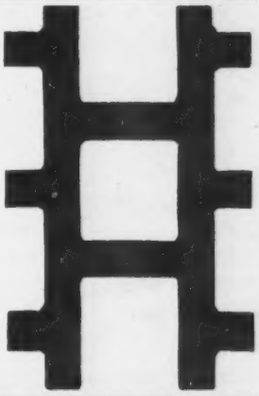

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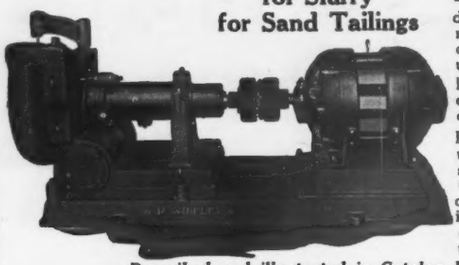
PATENTED

for Slurry
for Sand Tailings



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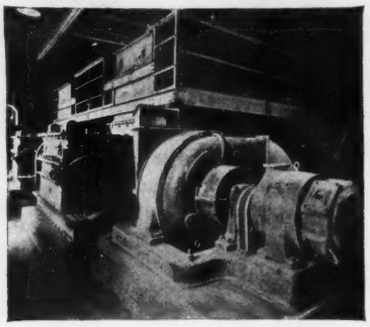

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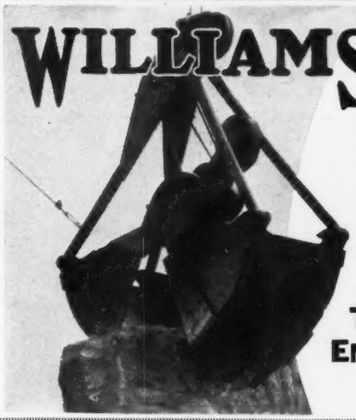

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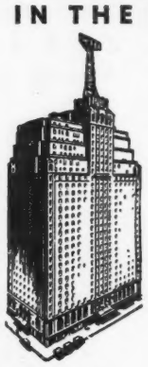

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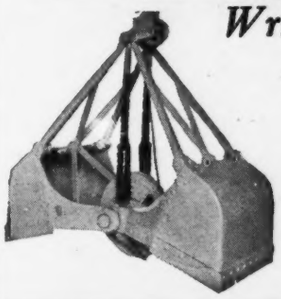

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(A TYPE AND SIZE FOR EVERY JOB)

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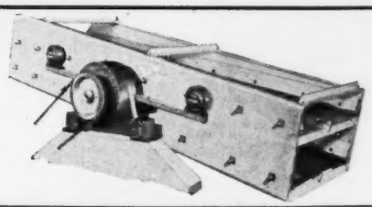

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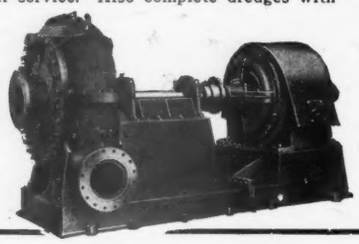

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.....Belt Dressing	.....Crusher Parts	.....Frogs and Switches	.....Oils and Lubricants	.....Screening Equipment
.....Belting, Conveyor	.....Crushing Plants	.....Gas Producers	.....Packing, Hydraulic	.....Screening Plants
.....Belting, Transmission	.....Crushers	.....Gear Speed Reducers	.....Packing, Piston	.....Screens
.....Bins, Batching	.....Derricks	.....Gears	.....Packing, Sheet	.....Sheaves
.....Bins, Storage	.....Dragline Excavators	.....Generators, Electric	.....Packing, Superheat	.....Steam Shovels
.....Bin Gates	.....Dragline Cableway Excavators	.....Hand Shovels	.....Paints and Coatings	.....Steel, High Speed
.....Blast Hole Drills	.....Dredging Pumps	.....Hoisting Engines	.....Perforated Metal	.....Steel, Wear Resistant Alloy
.....Blasting Powder	.....Drill Steel	.....Hoists	.....Pipe, Iron and Steel	.....Stokers, Automatic
.....Block Machines, Cement	.....Drill Sharpening Machines	.....Hose, Air Drill	.....Pipe Threading Machines	.....Tanks, Steel
.....Block Machines, Gypsum	.....Drills, Blast Hole	.....Hose, Pneumatic Tool	.....Power Transmission Equipment	.....Tanks, Wood
.....Bodies, Motor Truck	.....Drills, Hand Hammer	.....Hose, Steam	.....Pulleys	.....Track Material
.....Boilers	.....Drills, Tripod	.....Hose, Water	.....Pulverizers	.....Tractors, Caterpillar
.....Buckets, Clam Shell	.....Dryers, Sand and Stone	.....Hydraulic Dredges	.....Pumps, Centrifugal	.....Transformers, Electric
.....Buildings, Portable	.....Dynamite	.....Industrial Railways	.....Pumps, Deep Well	.....Turbines, Steam
.....Cable Coatings	.....Dump Bodies, Truck	.....Lights, Carbide	.....Pumps, Gasoline	.....Unloaders
.....Cableways	.....Dump Cars	.....Lights, Flood	.....Pumps, Steam	.....Valves and Fittings
.....Calcining Machinery	.....Dump Wagons	.....Lime Hydrators	.....Pyrometers	.....Washing Equipment
.....Cars, Quarry	.....Dust Collecting Systems	.....Lime Kilns	.....Rails	.....Weighing Equipment
.....Car Pullers	.....Electrical Control Equipment	.....Loaders, Portable	.....Refractories	.....Welding, Electric
.....Car Replacers	.....Elevators and Conveyors	.....Locomotive Cranes	.....Respirators	.....Welding, Oxy-Acetylene
.....Cement Block Machinery	.....Engineering Service	.....Locomotives, Electric	.....Rock Drills	.....Winches
.....Chain Drive, High Speed		.....Locomotives, Gasoline	.....Roofing Tile Machines	.....Wire Cloth
.....Chain Hoists		.....Locomotives, Steam	.....Rope Drive	.....Wire Rope
.....Chain, Power Shovel		.....Machine Shop Equipment		
.....Chain, Transmission				

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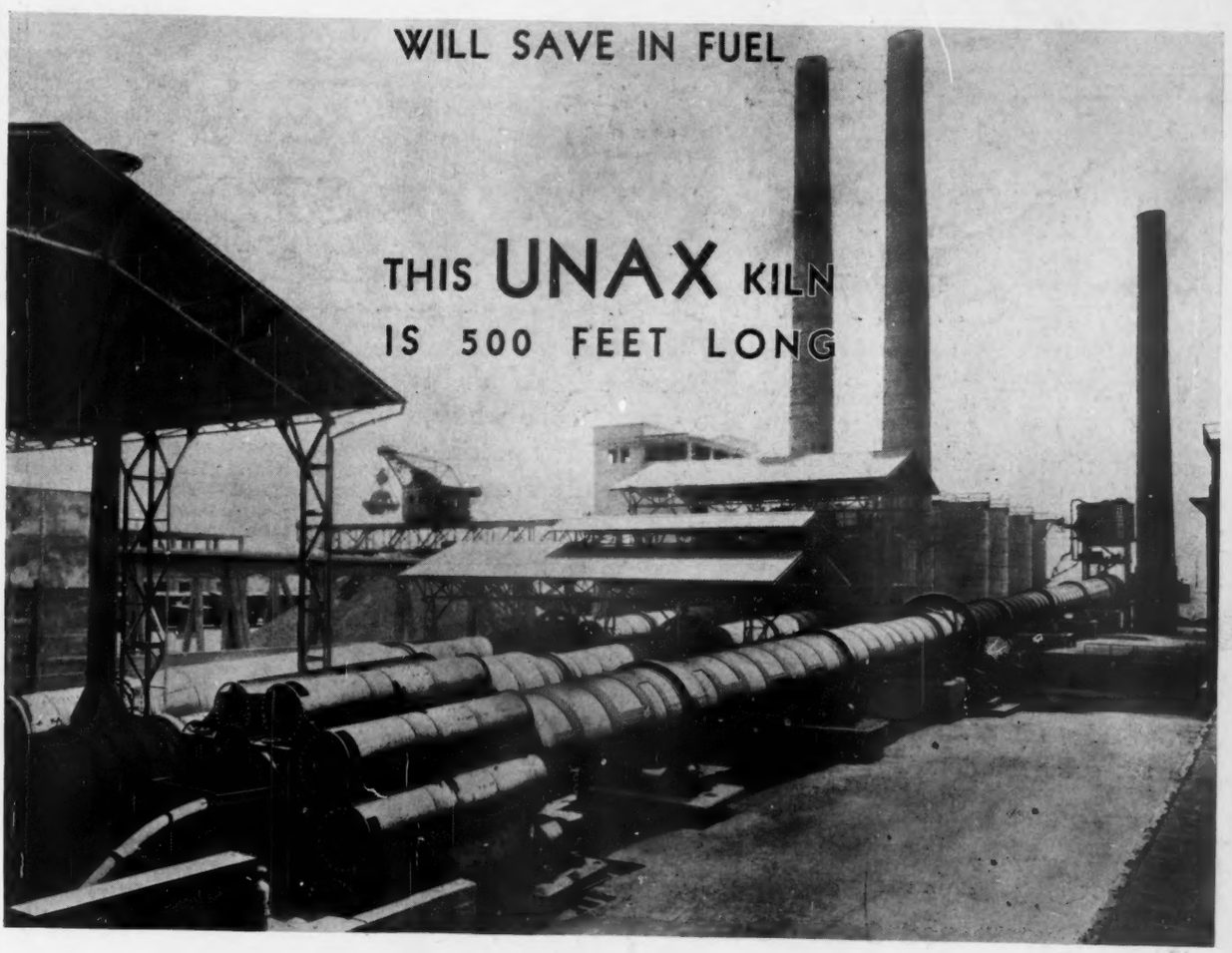

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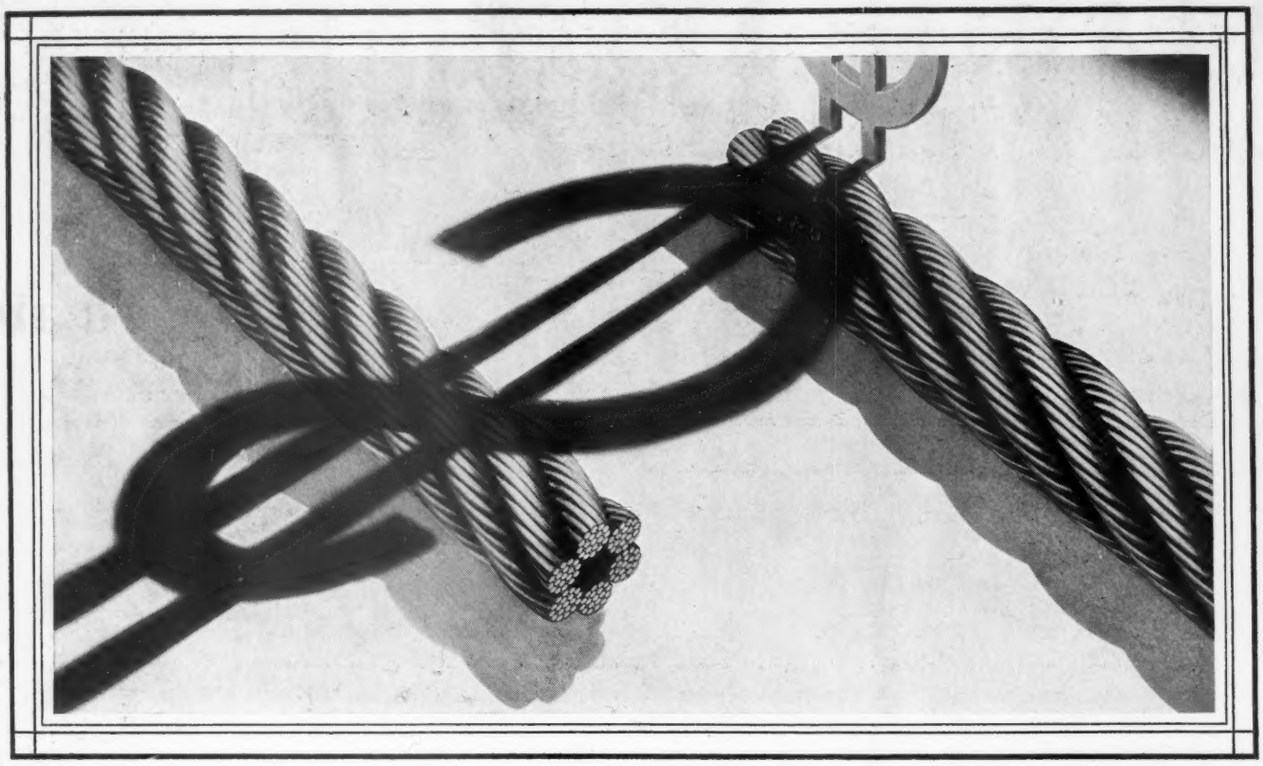

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Roebling does not indulge in nor encourage sweeping claims of superior wire rope economy. Such claims, if generally made, would merely confuse the rope user. ¶ For the guidance of rope buyers, however, Roebling does assert that when gauged by the work performed, NO wire rope, regardless of make or construction, will show lower general average operating costs than Roebling.

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The importance of selecting the right rope for each use cannot be too strongly emphasized. For no one rope will meet all requirements. ¶ Roebling makes wire rope of a great variety of types and designs, including Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of rope and strand flexibility. ¶ The great stamina of all Roebling Ropes is primarily due to the quality of Roebling Wire. This Acid Steel Wire is renowned for its fatigue resisting and wearing qualities. No better rope wire is produced. ¶ "BLUE CENTER" STEEL is the highest grade and is generally recommended for severe duty.

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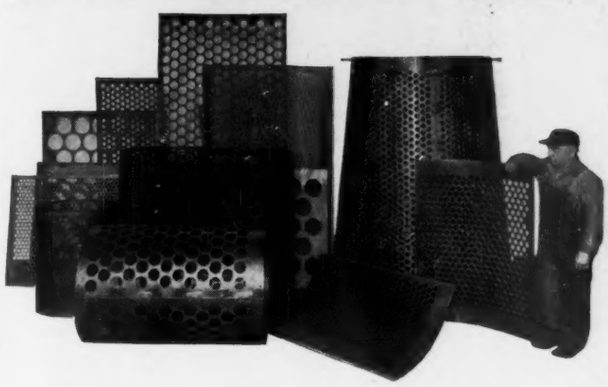

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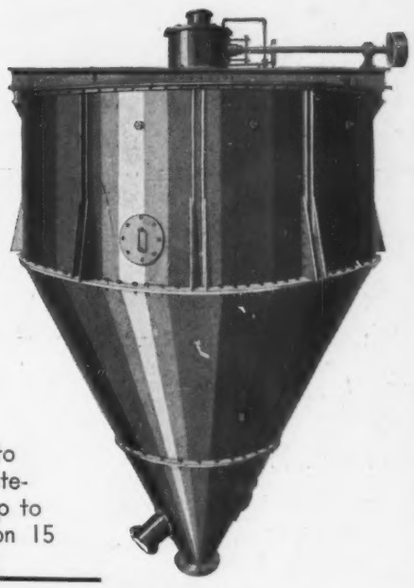

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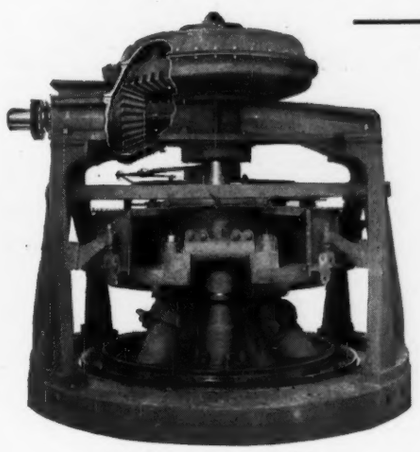

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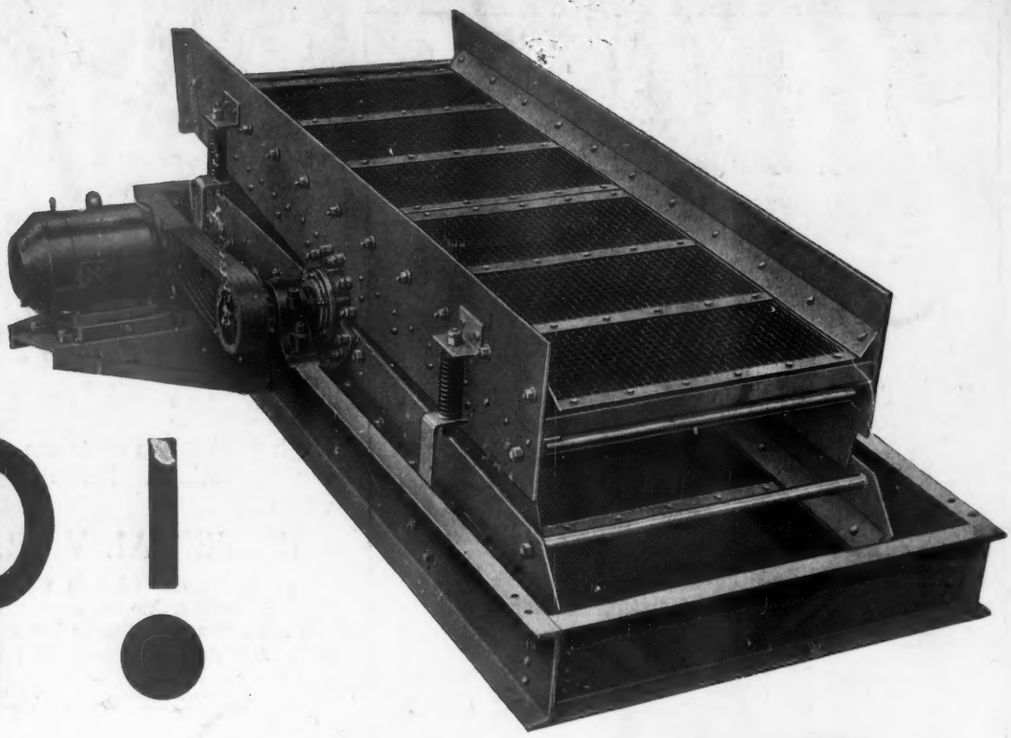

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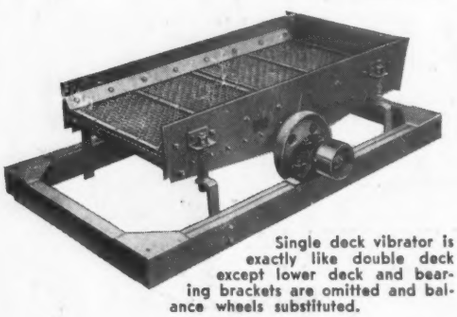

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